

LEGEND										
PIPING			DUCT			EQUIPMENT-DUCT				
SYMBOL	DESCRIPTION	ABBREV.	SYMBOL	SINGLE LINE	DESCRIPTION	ABBREV.	SYMBOL	SINGLE LINE	DESCRIPTION	ABBREV.
	REFRIGERANT DISCHARGE	RD			DUCT SIZE FIRST FIGURE IS SIDE VIEW, SECOND FIGURE IS TOP VIEW, Ø = ROUND, □ = FLAT OVAL				TERMINAL UNIT - REHEAT COIL, VARIABLE VOLUME, VAV, REHEAT, FAN POWERED UNIT W/SERVICE CLEARANCE	VARIES
	REFRIGERANT SUCTION	RS			ACOUSTICAL INSULATION				TERMINAL UNIT, D.D.C. EXISTING TO REMAIN	DD- ----
	AIR RELIEF LINE (VENT)	V			FLEXIBLE CONNECTION (FC)				DUCT HEATER, ELECTRIC	EDH
	CONDENSATE DRAIN LINE	C			FLEXIBLE DUCT (FID) (SHOWN WITH DIFFUSER)				REHEAT COIL	RHC- ---
FITTINGS					DUCT SECTION, POSITIVE PRESSURE FIRST FIGURE IS TOP SIDE		DAMPERS			
					DUCT SECTION, NEGATIVE PRESSURE FIRST FIGURE IS TO SIDE				COMBINATION SMOKE/FIRE DAMPER AT WALL OR RISER	SD/FD
	CONCENTRIC REDUCER	RED			DUCT SECTION, POSITIVE PRESSURE AIR DUCT TURNING UP				SMOKE DAMPER AT WALL OR RISER	SD
	ECCENTRIC REDUCER FLAT ON TOP	FOT			POSITIVE PRESSURE AIR DUCT TURNING DOWN				FIRE DAMPER AT WALL OR RISER	FD
	TEE OUTLET UP	TUP			DUCT TURNING UP WITH RADIUS ELBOW				BACKDRAFT DAMPER	BDD
	TEE OUTLET DOWN	TON							AUTOMATIC CONTROL DAMPER, ELECTRIC, MODULATING U.O.N.	
	LATERAL	LA							MANUAL VOLUME DAMPER (MVD)	MVD
	TEE	T							ACCESS DOORS, VERTICAL OR HORIZONTAL	AD
	ELBOW TURNED DOWN	DN			EXPANSION OR CONTRACTION, SINGLE SIDED OR TWO SIDED		DIFFUSERS AND GRILLES			
	ELBOW TURNED UP	UP							SIDEWALL GRILLE, REGISTER REVERSE ARROW FOR RETURN	
	END CAP	EC			TRANSITION FROM RECT. TO ROUND				OPEN END DUCT WITH 1/4"x 1/4" WIRE MESH SCREEN	OED
	BLIND FLANGE	BF			SQUARE ELBOW WITH TURNING VANES (TV)				CEILING GRILLE, REGISTER FOR RETURN OR EXHAUST AIR, SEE "DIFFUSER & GRILLE SCHEDULE"	
EQUIPMENT-PIPING					RADIUS ELBOW				CEILING SUPPLY DIFFUSER, RECTANGULAR OR SQUARE, SEE "DIFFUSER AND GRILLE SCHEDULE"	
									LINEAR DIFFUSER	
	OPEN FUNNEL DRAIN	FU							AIR THROUGH UNDERCUT DOOR	
	PUMP	P								
CONTROL LEGEND					90° TAKE-OFF WITH 45° TAB COLLAR (OR BOOT) FITTING		GENERAL			
	MOTOR STARTER				CHANGE IN ELEVATION - (RISE OR DROP) WHERE R=RISE AND D=DROP, ARROW INDICATES THE DIRECTION OF AIR FLOW.				RATED WALL	
	VARIABLE FREQUENCY DRIVE									
	HAND-OFF-AUTO SWITCH									
	OPPOSED BLADE DAMPER									
	DAMPER ACTUATOR (ELECTRONIC)									
	DIFFERENTIAL AIR PRESSURE SWITCH									
	DIFFERENTIAL PRESSURE SENSOR									
	DUCT MOUNTED, AVERAGING TEMP. SENSOR									
	CARBON DIOXIDE SENSOR (ROOM)									
	CARBON DIOXIDE SENSOR (DUCT)									
	MICROPROCESSOR									
	DUCT SMOKE DETECTOR, S-1									
	AIR FLOW MEASURING STATION									
	PRESSURE PROBE SENSOR									
	END SWITCH									
	NATURAL GAS FURNACE									
	RELAY									
	SPACE TEMPERATURE SENSOR									
	PROBE TYPE TEMPERATURE SENSOR									
	SHIELDED BULB AIR TEMPERATURE SENSOR									
	PROBE TYPE SPACE HUMIDITY SENSOR									
	SPACE HUMIDITY SENSOR									
	SPACE TEMPERATURE SENSOR									
	CURRENT TRANSDUCER									
	APPLICATION SPECIFIC CONTROLLER									
	FREEZE PROTECTION THERMOSTAT									
	RELAY CONTACTS									
	ANALOG INPUT									
	ANALOG OUTPUT									
	DIGITAL INPUT									
	DIGITAL OUTPUT									
	NORMALLY CLOSED									
	NORMALLY OPEN									
	DOOR SWITCH									

GENERAL NOTES (APPLIES TO ALL "M" DRAWINGS)										
<p>1. THE PROJECT REQUIRES SPECIAL CONSTRUCTION, SEQUENCING, MATERIAL HANDLING, AND PROCEDURES NECESSARY TO ASSURE ACHIEVEMENT OF LEED-NC 2009 SILVER RATING. CONTRACTOR IS REQUIRED TO CLOSELY FOLLOW THE LEED REQUIREMENTS AND COMPLY WITH THEM ACCORDINGLY. SEE SPECIFICATION 018113 - SUSTAINABLE DESIGN REQUIREMENTS.</p> <p>2. THESE DRAWINGS ARE SCHEMATIC IN NATURE AND ARE NOT INTENDED TO SHOW ALL POSSIBLE CONDITIONS (DO NOT SCALE FOR LOCATIONS). IT IS INTENDED THAT A COMPLETE HEATING, VENTILATING AND AIR CONDITIONING SYSTEM (HVAC) BE PROVIDED WITH ALL NECESSARY EQUIPMENT, APPURTENANCES AND CONTROLS. THE CONTRACTOR SHALL CAREFULLY REVIEW ALL THE CONTRACT DOCUMENTS AND COORDINATE BETWEEN ALL TRADES PRIOR TO SUBMITTING SHOP DRAWINGS. THE CONTRACTOR SHALL PREPARE INSTALLATION INSTRUCTIONS AND FABRICATION DRAWINGS PRIOR TO ACTUAL INSTALLATION.</p> <p>3. THE CONTRACTOR SHALL FULFILL ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS AND SHALL COMPLETE THE WORK SHOWN ON THESE DRAWINGS. ALL SYSTEMS SHALL BE FINISHED, TESTED AND BALANCED, ADJUSTED, AND PROVEN TO BE FULLY OPERATIONAL AND USEABLE. PROVIDE EQUIPMENT OPERATIONS AND TESTING TO COMPLETE OWNER'S COMMISSIONING OF NEW EQUIPMENT AND SYSTEMS CONTROLS.</p> <p>4. SOLVENTS, PAINTS, ADHESIVES, SEALANTS AND OTHER MATERIALS THAT EMIT POLLUTANTS SHALL COMPLY WITH LEED NC 2009 REQUIREMENTS. THE CONTRACTOR SHALL "TUSH-OUT" THE SPACE BEFORE HAND OVER.</p> <p>5. PERFORM ALL ADJUSTMENTS AND BALANCING NECESSARY FOR THE SYSTEM TO PRODUCE THE INDICATED AIR QUANTITIES. CONTRACTOR IS RESPONSIBLE FOR TESTING AND BALANCING OF AIR SYSTEMS IN ACCORDANCE WITH ASHRAE GUIDELINES. A TEST AND BALANCE REPORT SHALL BE SUBMITTED TO THE A/E/C AND ENGINEER FOR APPROVAL.</p> <p>6. PROVIDE BLIND FLANGE COVER/CAPS ON ALL VALVE STUBOUTS WHETHER TEMPORARY OR PERMANENT FOR FUTURE USE.</p> <p>7. MAINTAIN CODE REQUIRED CLEARANCE SWITCHGEAR AND STARTER PANELS INCLUDING OVERHEAD CLEARANCES FROM PIPING.</p> <p>8. AVOID RUNNING DUCT OR PIPING OVER ALL ELECTRICAL PANELS OR SWITCHGEAR, OR ELECTRICAL OR ELEVATOR ROOMS.</p> <p>9. WHERE UNAVOIDABLE AND ABOVE VERTICAL CODE LIMITS, PROVIDE SHEET METAL WATER SHIELD PROTECTION OVER EQUIPMENT OR PANELS (EXCEPT PUMPS) WITH PIPE RUNS HIGHER THAN 6 FEET OVERHEAD. LOWER PIPE IS NOT ALLOWED.</p> <p>10. PROVIDE AUTO CAD 2012 FORMAT SHOP DRAWINGS PLOTTED AT 1/4" SCALE SHOWING CONDITIONS AND SYSTEMS THAT INSTALLATIONS ARE TO BE COORDINATED WITH AND SHOWING DUCT, PIPE &amp; EQUIPMENT TO SCALE WITH MAINTENANCE CLEARANCE. SEE INDIVIDUAL SPECIFICATION SECTIONS FOR ADDITIONAL REQUIREMENTS. PROVIDE AUTO CAD FILES WITH AS BUILT FIELD CORRECTIONS AS FINAL AS BUILT SUBMITTAL ALONG WITH PAPER PLOTS.</p> <p>11. DO NOT LOCATE VALVES, DAMPERS, ACTUATORS, CONTROL COMPONENTS, ANY EQUIPMENT WITH MOVING PARTS OR ANY EQUIPMENT NEEDING ACCESS OR REGULAR MAINTENANCE ABOVE INACCESSIBLE CEILINGS. WHERE LOCATIONS OF VALVES CONTROLS OR EQUIPMENT IS UNAVOIDABLE, PROVIDE MIN. 24"x24" ACCESS PANELS.</p> <p>12. SEE DRAWING SERIES M6.1.1 &amp; M6.1.2 FOR EQUIPMENT SCHEDULES.</p> <p>13. COORDINATE MECHANICAL AND ELECTRICAL SUCH THAT PIPING, DUCTWORK OR EQUIPMENT ARE NOT LOCATED OVER ANY ELECTRICAL EQUIPMENT.</p> <p>14. LOCATE ALL PIPING AND DUCTWORK ABOVE THE CEILING UNLESS OTHERWISE NOTED.</p> <p>15. TO ALLOW ACCESS AND MAINTENANCE, DO NOT LOCATE DUCT, PIPING AND EQUIPMENT MORE THAN 3 FEET ABOVE CEILING.</p> <p>16. RETURN AIR PLENUM IS USED ABOVE SPACE. NO COMBUSTIBLE MATERIAL SHALL BE INSTALLED WITH A FLAME SPREAD INDEX GREATER THAN 25 OR A SMOKE DEVELOPED INDEX GREATER THAN 50 ACCORDING TO ASTM STANDARD E84.</p>										
HVAC NOTES										
<p>1. CEILING DIFFUSER, RETURN AND EXHAUST GRILLE LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL COORDINATE WITH EXISTING CEILING GRID AND RELOCATE UP TO 6 FEET RADII FROM FLEXIBLE CONNECTION AT MAIN TO AVOID LIGHTS AND OTHER CEILING DEVICES.</p> <p>2. PROVIDE MANUAL BALANCING DAMPER AT TAKEOFF FROM MAIN DUCT TO EACH DIFFUSER OR GRILLE. WHERE DIFFUSER IS AT END OF MAIN, PROVIDE MANUAL BALANCING DAMPER IN ROUND DUCT AFTER RECTANGULAR TO ROUND TRANSITION. DO NOT PROVIDE BALANCING DAMPER IN DIFFUSER OR GRILLE NECK UNLESS NOTED ON DRAWINGS.</p> <p>3. DO NOT PROVIDE DAMPERS IN MEDIUM PRESSURE DUCT (UPSTREAM OF VAV'S) UNLESS NOTED OTHERWISE.</p> <p>4. PROVIDE DUCT OFFSETS OVER OR UNDER PIPING OR OBSTRUCTIONS AS REQUIRED. WHERE DUCT OFFSETS ARE REQUIRED, USE 45° SMOOTH RADIUS ELBOWS.</p> <p>5. PROVIDE CONICAL FITTINGS FOR ALL DUCT TAKEOFFS FROM MAIN DUCT OR BRANCH DUCT TO TERMINAL UNITS (VAV, VVR, ETC.).</p> <p>6. FOR RECTANGULAR DUCT UPSTREAM OF VVR'S, ALL TAKEOFFS FROM MAIN SHALL BE 45° TAB COLLARS (OR BOOT).</p> <p>7. DUCT RUNOUTS TO DIFFUSERS OR GRILLES ARE SAME SIZE AS NECK, UNLESS NOTED OTHERWISE (U.N.O.).</p> <p>8. ALL TRANSFER DUCTS ARE ACOUSTICALLY LINED TURNED-UP ELBOWS ABOVE THE CEILING, FOR EXAMPLE MAKEUP AIR AT RESTROOMS.</p> <p>9. ALL TRANSFER DUCTS TO TOILETS ARE ELBOWS FULL SIZE OF GRILLE NECK (UNLESS NOTED OTHERWISE ON PLANS) AND EXTENDED (ABOVE THE CEILING) THROUGH THE WALL TO CORRIDOR.</p> <p>10. SEE REFLECTED CEILING PLAN FOR LOCATION OF LIGHTS AND CEILING TYPE.</p> <p>11. FIBERGLASS DUCT IS NOT PERMISSIBLE.</p> <p>12. ALL SMOKE DAMPERS ARE COMBINATION FIRE AND SMOKE DAMPERS.</p> <p>13. ALL DUCTS WITH 90 DEGREE RECTANGULAR ELBOWS SHALL HAVE TURNING VANES.</p> <p>14. WHERE MANUAL VOLUME DAMPERS ARE LOCATED ABOVE INACCESSIBLE CEILINGS, BALANCING SHALL BE DONE BEFORE CEILINGS ARE INSTALLED.</p> <p>15. RUNOUTS TO T/U'S SHALL BE SAME SIZE AS UNIT NECK CONNECTION UNLESS RUNOUT LENGTH EXCEEDS 6'-0", THEN RUNOUT SHALL BE 2" LARGER DIAMETER THAN INLET CONNECTION.</p> <p>16. ALL DUCT DIMENSIONS ARE FREE AREA DIMENSIONS AND DO NOT INCLUDE ALLOWANCES FOR DUCT LINER THICKNESS.</p> <p>17. PROVIDE ACCESS DOORS FOR ALL DDC CONTROL DUCT MOUNTED EQUIPMENT.</p> <p>18. DUCT-MOUNTED SMOKE DETECTORS ARE TO BE FURNISHED BY ELECTRICAL. THEY ARE TO BE MOUNTED BY THE MECHANICAL. MECHANICAL SHALL WIRE CONTROLS FOR SHUTDOWN. VERIFY COMPATIBILITY WITH EXISTING FIRE ALARM SYSTEM.</p> <p>19. REFER TO ARCHITECTURAL FLOOR PLANS AND ELEVATIONS FOR REFER TO ARCHITECTURAL FLOOR PLANS AND ELEVATIONS FOR EXACT LOUVER LOCATIONS AND SIZES.</p> <p>20. DO NOT LOCATE TERMINAL UNITS (TU) ABOVE RECESSED CAN LIGHTS OR DIRECTLY BELOW BEAMS.</p> <p>21. ROUTE DUCTWORK BETWEEN BEAMS TIGHT TO BOTTOM OF STRUCTURE. OFFSET BELOW BEAMS WHERE NECESSARY.</p> <p>22. FOR ALL TERMINAL UNITS WITH OR WITHOUT ELECTRIC HEATERS ALLOW 3'-6" MINIMUM SERVICE CLEARANCE.</p> <p>23. PROVIDE FLEX DUCT CONNECTORS AT ALL AHU FAN, AND FCU UNIT DUCT CONNECTIONS.</p> <p>24. DUCT MOUNTED SMOKE DETECTORS SHALL HAVE AIR VELOCITY RATING FROM 100 TO 4,000 FPM WITH A TRANSPARENT COVER FOR VISUAL INSPECTION. THE SENSOR SHALL BE FULLY COMPATIBLE WITH EXISTING FIRE ALARM SYSTEM AT FACILITY.</p> <p>25. PROVIDE DUCT ACCESS DOORS FOR ALL FIRE DAMPERS AND SMOKE DETECTORS.</p> <p>26. CONTRACTOR SHALL VERIFY AND ENSURE RETURN AIR PATH &amp; RELIEF AIR PATH FROM EACH ROOM FOR ALL AREAS USING PLENUM RETURN.</p> <p>27. MECHANICAL CONTRACTOR TO COORDINATE WITH ALL OTHER TRADES, TO ENSURE THAT THE PLENUM RATED CABLES ARE PROVIDED ABOVE CEILING PLENUM AND ALL OTHER MATERIALS ARE PLENUM RATED OR NON-COMBUSTIBLE.</p>										

SHEET NUMBERING SYSTEM	
<b>M 1.1.1</b>	SECTOR INDICATOR (OPTIONAL) SEQUENCE NUMBER / FLOOR NUMBER SHEET TYPE DESIGNATOR DISCIPLINE DESIGNATOR
SHEET TYPE DESIGNATOR	
#	DESCRIPTION
0	GENERAL
1	NOT USED
2	HVAC PLANS
3	SECTIONS
4	ENLARGED DETAILS
5	DETAILS
6	EQUIPMENT SCHEDULES
7	CONTROLS DIAGRAMS

CITY OF ATLANTA, GEORGIA

Hartsfield-Jackson  
Atlanta International Airport

HEERY INTERNATIONAL, INC. 999  
PEACHTREE STREET, NE  
ATLANTA, GA 30309  
PHONE: 404.418.9190  
FAX: 404.582.2017

MATROX 3D  
44 BROAD STREET  
ATLANTA, GA 30303  
PHONE: 404.522.3801  
FAX: 404.522.3833

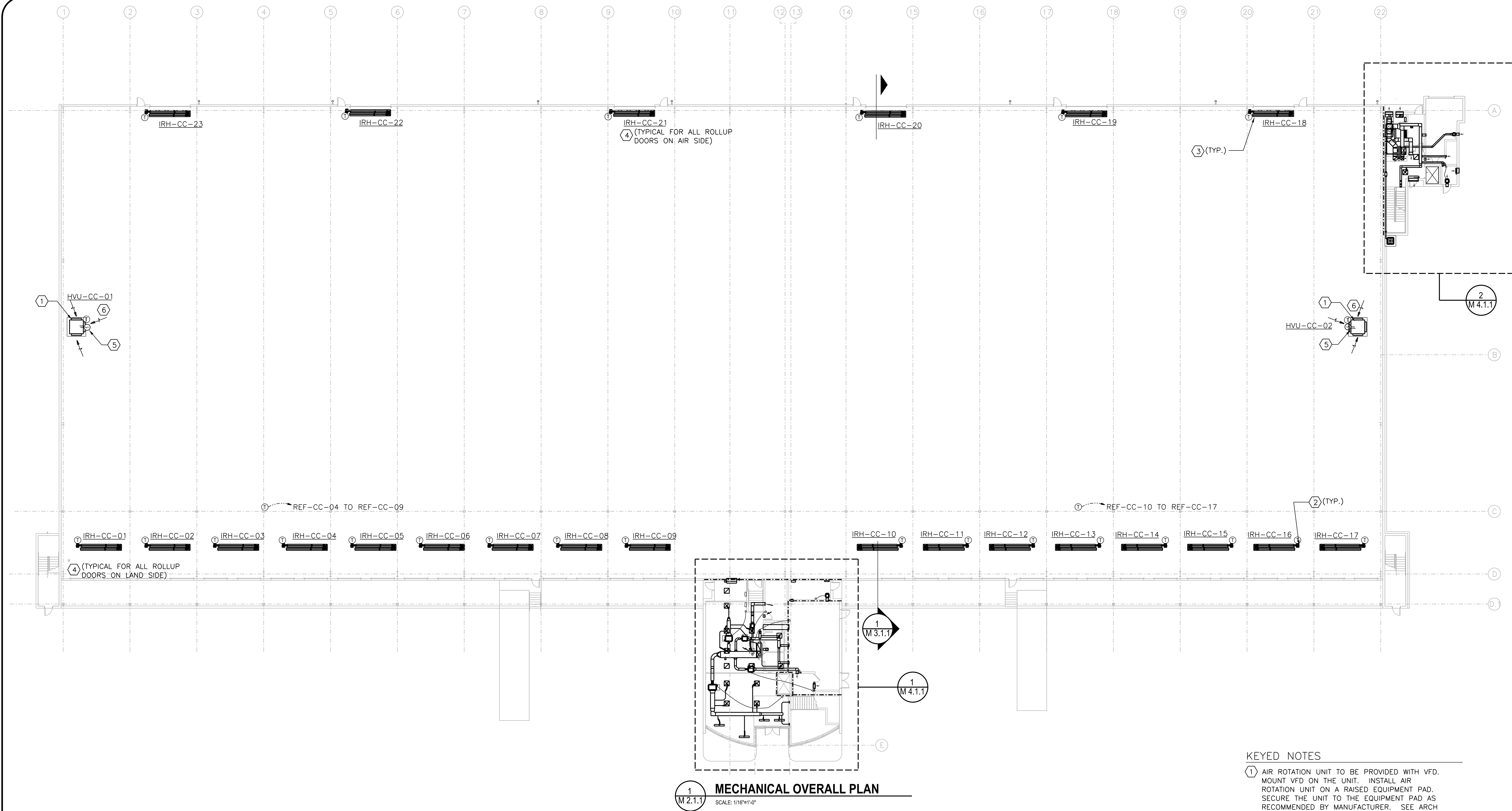
STEVENS & WILSON, INC.  
100 PEACHTREE STREET NW, SUITE 2500  
ATLANTA, GA 30303  
PHONE: 770.321.9008  
FAX: 770.321.3935

SOUTHEASTERN ENGINEERING, INC. (SEI)  
2015 SANDY PLAINS ROAD  
MARIETTA, GA 30066  
PHONE: 770.321.9008  
FAX: 770.321.3935

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AIR CARGO BUILDING C, 100% CONSTRUCTION DOCUMENTS ISSUED FOR BID, NOVEMBER 25, 2014

NOT RELEASED FOR CONSTRUCTION



- KEYED NOTES
- (1) AIR ROTATION UNIT TO BE PROVIDED WITH VFD. MOUNT VFD ON THE UNIT. INSTALL AIR ROTATION UNIT ON A RAISED EQUIPMENT PAD. SECURE THE UNIT TO THE EQUIPMENT PAD AS RECOMMENDED BY MANUFACTURER. SEE ARCH PLANS FOR GUARD RAIL.
  - (2) INFRARED HEATERS TO BE INSTALLED AND STAY CLEAR OF THE LOADING DOCK DOORS. COORDINATE WITH OTHER TRADES. SUSPEND UNIT THROUGH FACTORY PROVIDED CHAINS. ALL INSTALLATION TO MEET MANUFACTURER'S RECOMMENDATIONS. SEE DETAIL 3/M5.1.2.
  - (3) INFRARED HEATERS TO BE INSTALLED FROM MAIN STRUCTURE MEMBERS. REFER TO EQUIPMENT SCHEDULE FOR MOUNTING HEIGHT. INSTALLATION TO MEET MANUFACTURER'S RECOMMENDATIONS. SEE DETAIL 3/M5.1.2. COORDINATE LOCATION TO CLEAR LOADING DOCKS DOORS.
  - (4) RELAY FOR WAREHOUSE DOOR TO BE PROVIDED WITH ROLL UP DOORS. COORDINATE AND ENSURE THAT REQUIRED DDC TIE-INS ARE PROVIDED TO COMMUNICATE THEIR STATUS TO DDC SYSTEM.
  - (5) DUCT MOUNTED SMOKE DETECTOR IN RETURN AIR SECTION OF HVU.
  - (6) MOUNT TEMPERATURE SENSOR AT 10'-0" A.F.F. ON THE UNIT.



CITY OF ATLANTA, GEORGIA

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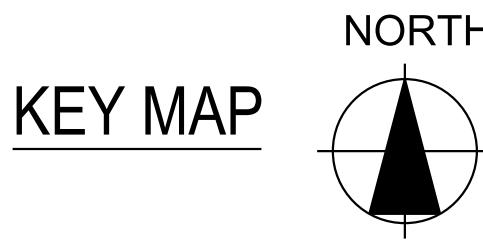
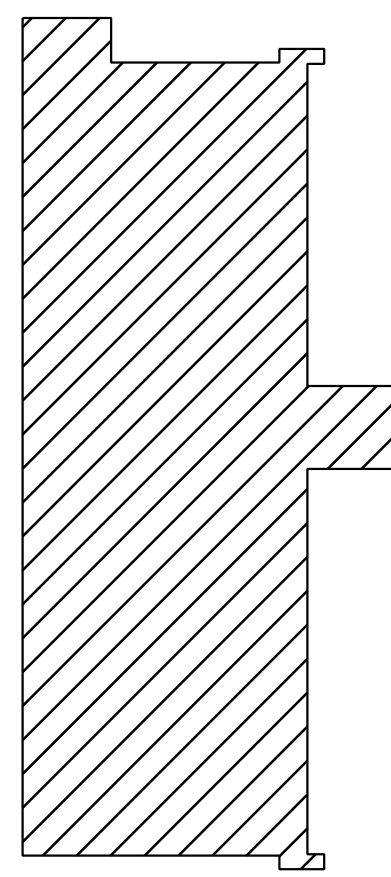


HEERY INTERNATIONAL, INC. 999  
PEACHTREE STREET, NE  
ATLANTA, GA 30309  
PHONE: 404.415.9190  
FAX: 404.545.2017

MATROX 3D  
44 BROAD STREET  
ATLANTA, GA 30303  
PHONE: 404.522.3801  
FAX: 404.522.3833

STEVENS & WILKINSON, INC.  
100 PEACHTREE STREET NW, SUITE 2500  
ATLANTA, GA 30303  
PHONE: 404.522.8888  
FAX: 404.521.6204

SOUTHEASTERN ENGINEERING, INC. (SEI)  
201 SANDY PLAINS ROAD  
MARIETTA, GA 30066  
PHONE: 770.321.9308  
FAX: 770.321.3935



NO. DATE BY REVISION

AIR CARGO BUILDING C

MECHANICAL  
OPERATIONS LEVEL  
HVAC PLAN

WBS NUMBER:  
D.07.55.009  
FC NUMBER:  
FC-6006007529-A  
A/E PROJECT NUMBER:  
HI-0730621

DRAWN BY:  
K. MILNER  
DESIGNED BY:  
R. ANWAR  
CHECKED BY:  
D. POPE  
APPROVED BY:  
R. ANWAR

DATE:  
11/25/2014

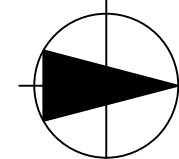
SCALE:  
AS NOTED

SHEET NO.:

M 2.1.1

SEAL

NORTH





CITY OF ATLANTA, GEORGIA

Hartsfield-Jackson  
Atlanta International Airport



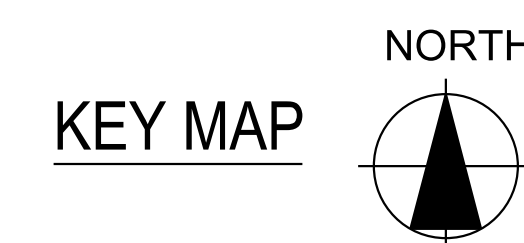
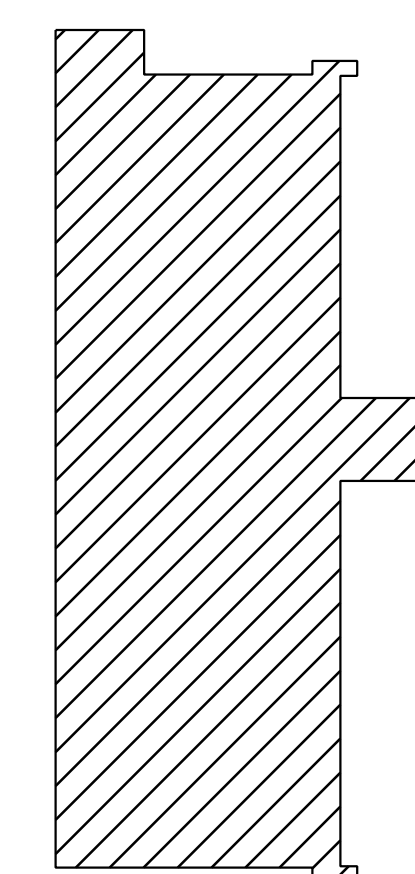
HEERY INTERNATIONAL, INC. 999  
PEACHTREE STREET, NE  
ATLANTA, GA 30309  
PHONE: 404.416.5190  
FAX: 404.546.2017

MATROX 3D  
44 BROAD STREET  
ATLANTA, GA 30303  
PHONE: 404.522.3801  
FAX: 404.522.3833

STEVENS & WILKINSON, INC.  
100 PEACHTREE STREET NW, SUITE 2500  
ATLANTA, GA 30303  
PHONE: 404.522.8888  
FAX: 404.521.6204

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201 SANDY PLAINS ROAD  
MARIETTA, GA 30066  
PHONE: 770.321.9308  
FAX: 770.321.3935

AIR CARGO BUILDING C, 100% CONSTRUCTION DOCUMENTS ISSUED FOR BID, NOVEMBER 25, 2014



KEY MAP

NO. DATE BY REVISION

AIR CARGO BUILDING C

MECHANICAL  
OFFICE LEVEL  
HVAC PLAN

WBS NUMBER:  
D.07.55.009

DRAWN BY:  
K. MILNER

FC NUMBER:  
FC-6006007529-A

DESIGNED BY:  
R. ANWAR

A/E PROJECT NUMBER:  
HII-0730621

CHECKED BY:  
D. POPE

APPROVED BY:  
R. ANWAR

DATE:  
11/25/2014

SCALE:  
AS NOTED

SHEET NO.  
M 2.2.1

SEAL

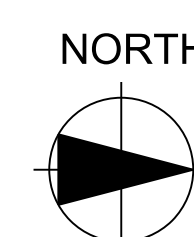
NOT RELEASED FOR CONSTRUCTION

# MECHANICAL OVERALL PLAN

SCALE: 1/16"=1'-0"

## KEYED NOTES

- 1 PROVIDE WITH SUPPLY AIR GRILLE AT THE DISCHARGE OF THE TERMINAL UNIT.
- 2 PROVIDE 12X12 TRANSFER AIR OPENING ABOVE CEILING.
- 3 HEATING AND VENTILATION UNIT MOUNTED ON WAREHOUSE FLOOR. SEE M 2.1.1.
- 4 PROVIDE BIRDSCREEN AT THE DUCT.
- 5 PROVIDE ROOF MOUNTED EXHAUST FAN WITH VFD ON ROOF ABOVE. SEE M2.3.1.
- 6 VFD FOR EXHAUST FAN MOUNTED IN THE HALLWAY CLOSEST TO EXHAUST FAN ABOVE EGRESS HEIGHT.
- 7 72X36 TRANSFER/RELIEF AIR OPENING ABOVE CEILING. PROVIDE WITH FIRE DAMPER AND AUTOMATIC DAMPER.
- 8 DUCT MOUNTED DUCT STATIC PRESSURE SENSOR.
- 9 DUCT MOUNTED SMOKE DETECTOR IN SUPPLY AIR DUCT SECTION OF HVU.







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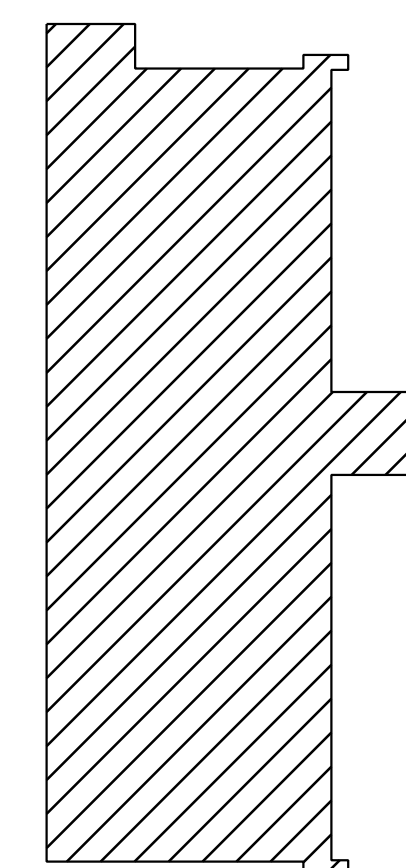
Hartsfield-Jackson  
Atlanta International Airport

**HSST**

HEERY INTERNATIONAL, INC. 959  
PEACHTREE STREET, NE  
ATLANTA, GA 30309  
PHONE: 404.418.9190  
FAX: 404.548.2017

MATROX 3D  
44 BROAD STREET  
ATLANTA, GA 30303  
PHONE: 404.522.3801  
FAX: 404.522.3803

SOUTHEASTERN ENGINEERING, INC. (SEI)  
2401 SANDY PLAINS ROAD  
MARIETTA, GA 30066  
PHONE: 770.321.9308  
FAX: 770.321.3905



KEY MAP

NORTH

NO.	DATE	BY	REVISION

AIR CARGO BUILDING C

**MECHANICAL  
ROOF LEVEL  
HVAC PLANS**

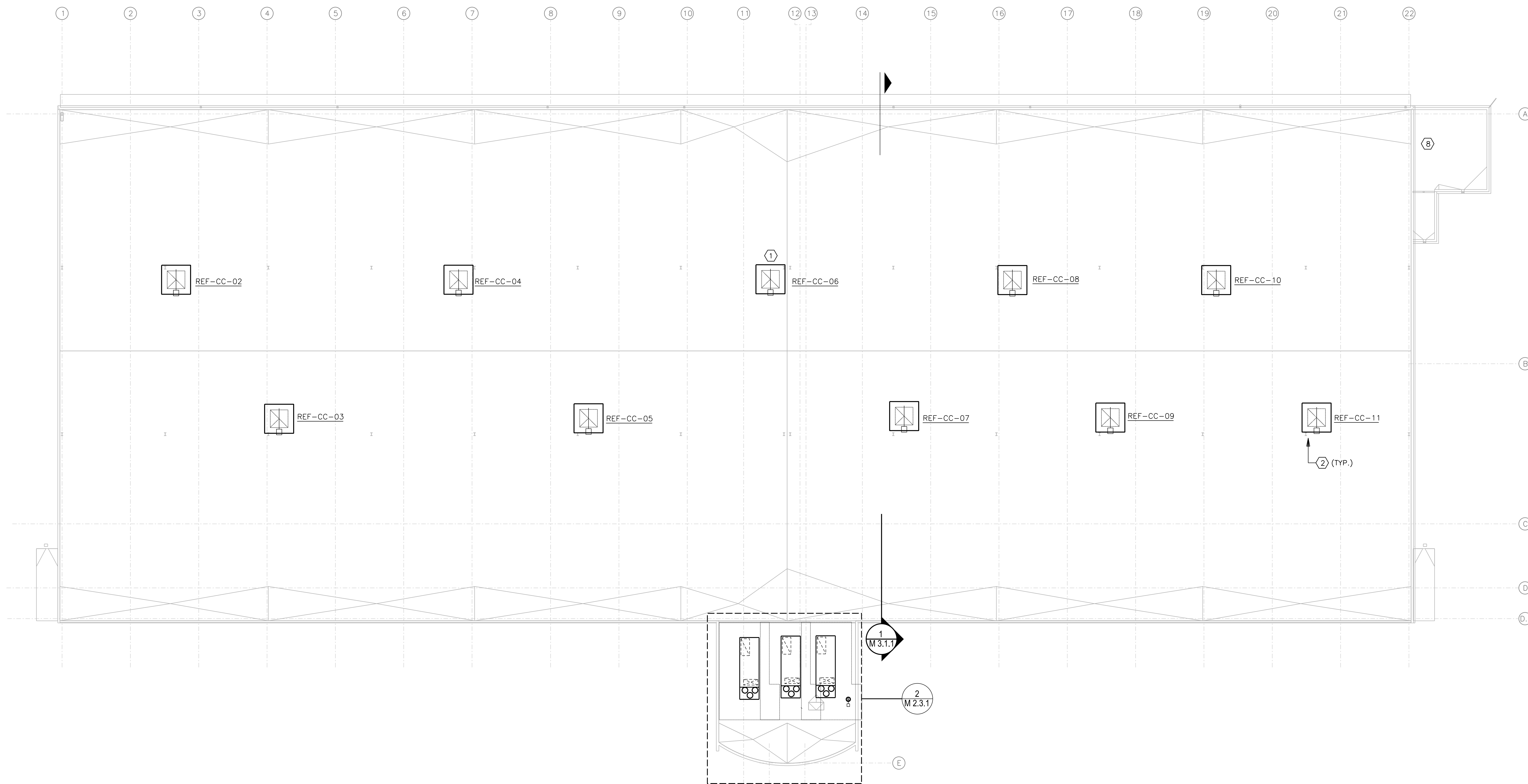
ISS NUMBER: D.07.55.009	DRAWN BY: K. MILNER
FC NUMBER: FC-6006007929-A	DESIGNED BY: R. ANWAR
A/E PROJECT NUMBER: HI-0730621	CHECKED BY: D. POPE
	APPROVED BY: R. ANWAR

DATE:  
11/25/2014

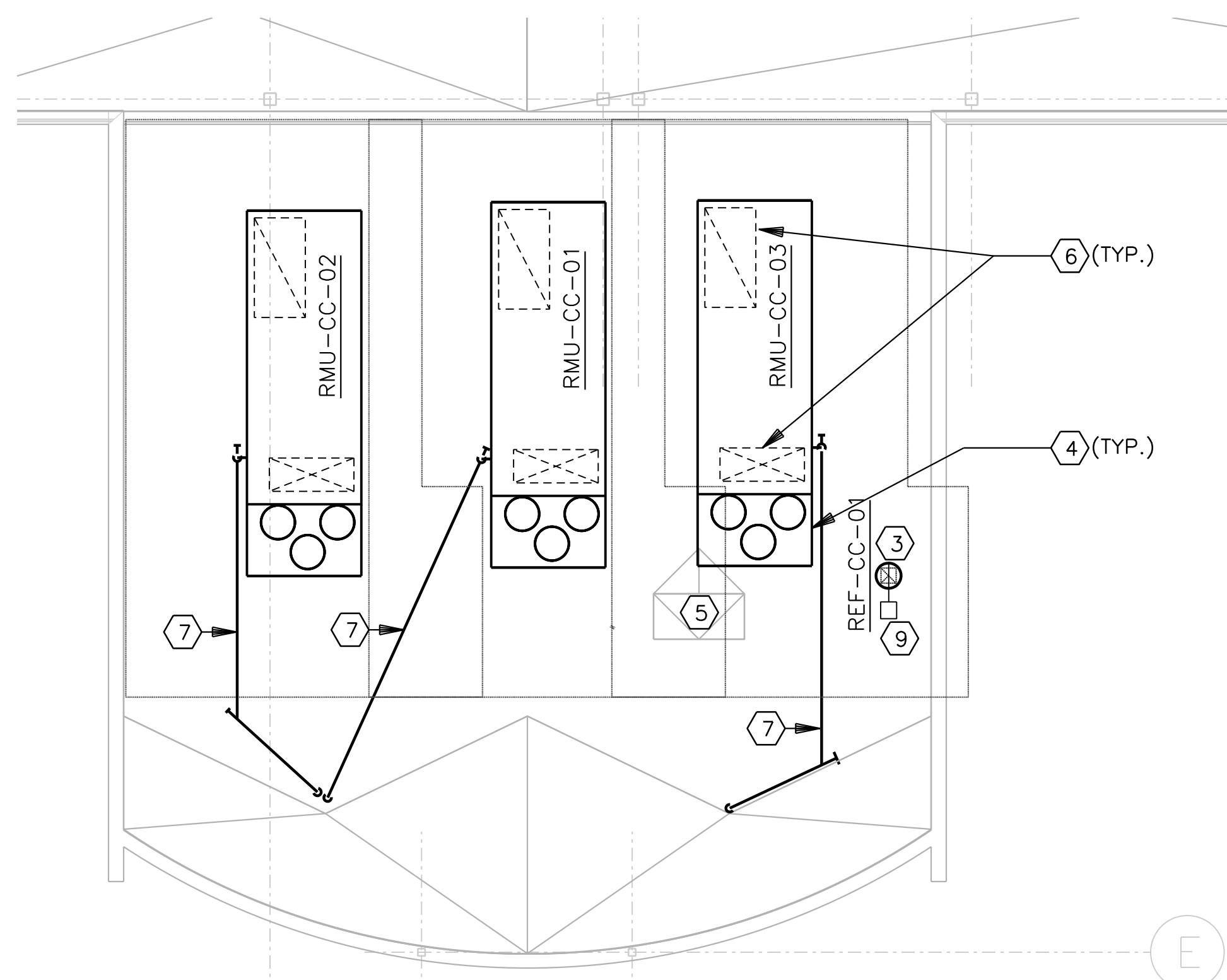
SCALE:  
AS NOTED

SHEET NO.  
**M 2.3.1**

SEAL



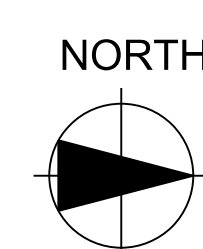
**1 MECHANICAL OVERALL PLAN**  
SCALE: 1/16"=1'-0"



**2 MECHANICAL PARTIAL PLAN**  
SCALE: 1/16"=1'-0"

**KEYED NOTES**

- COORDINATE THE INSTALLATION OF REF-CC-06 WITH BUILDING EXPANSION JOINT.
- PROVIDE ACCESS TO AUTOMATIC DAMPERS FROM ROOF. PROVIDE BIRD SCREEN AT DISCHARGE HOOD OF THE FAN AND INTAKE DUCT IN THE WAREHOUSE. PROVIDE FANS ON FACTORY SUPPLIED ROOF CURB. PROVIDE WITH 120V/1 PH DAMPER ACTUATOR.
- KEEP FAN DISCHARGE AND RMU OA AIR INTAKE MINIMUM OF 10'-0" FROM EACH OTHER. PROVIDE FAN AND FACTORY SUPPLIED ROOF CURB.
- PROVIDE RMUS ON FACTORY SUPPLIED ROOF INSULATED CURBS. PACK THE VOID SPACE BETWEEN ROOF AND RMU WITH BATT INSULATION. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCE AROUND THE UNIT.
- ROOF HATCH; KEEP IT CLEAR. SEE ARCHITECTURAL ROOF PLAN. COORDINATE CRICKET LOCATION WITH RMU.
- SUPPLY AND RETURN AIR DUCT DIMENSIONS TO MATCH UNIT OPENINGS.
- PROVIDE 1" CONDENSATE DRAIN LINE, EXTEND IT TO NEAREST ROOF DRAIN. SEE 2/M 5.1.2 FOR TRAP DETAIL. PROVIDE RECOMMENDED SLOPE TOWARDS THE DIRECTION OF FLOW. PROVIDE PIPE SUPPORTS AT EVERY 10 FEET.
- 6" TYPE-B VENT FROM AC-CC-01 ON FIRST FLOOR. PROVIDE DISCHARGE CAP. EXTEND FLUE 36" HIGHER THAN CLOSEST OBSTACLE WITHIN 10'-0".
- PROVIDE ACCESS TO AUTOMATIC DAMPER FROM ROOF. PROVIDE BIRDSCREEN AT THE DISCHARGE.







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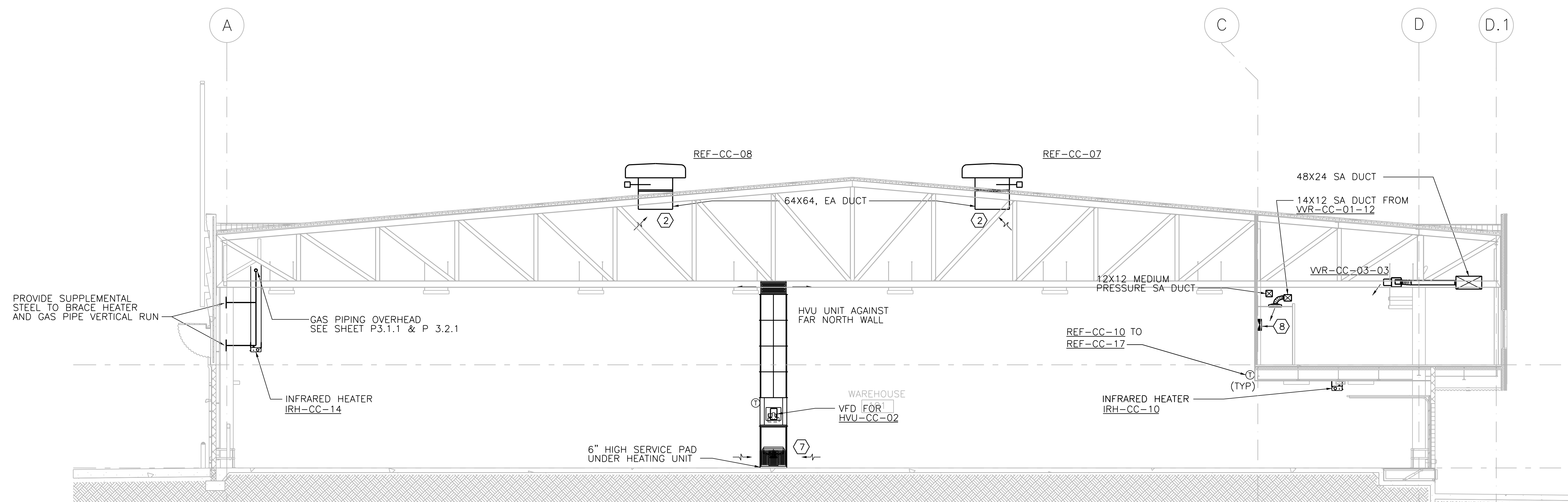
HERRY INTERNATIONAL, INC. 999  
PEACHTREE STREET, NE  
ATLANTA, GA 30309  
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MATROX 3D  
44 BROAD STREET  
ATLANTA, GA 30303  
PHONE: 404.522.3801  
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STEVENS & HARRISON, INC.  
100 PEACHTREE STREET NW, SUITE 2500  
ATLANTA, GA 30303  
PHONE: 404.522.8888  
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MARIETTA, GA 30066  
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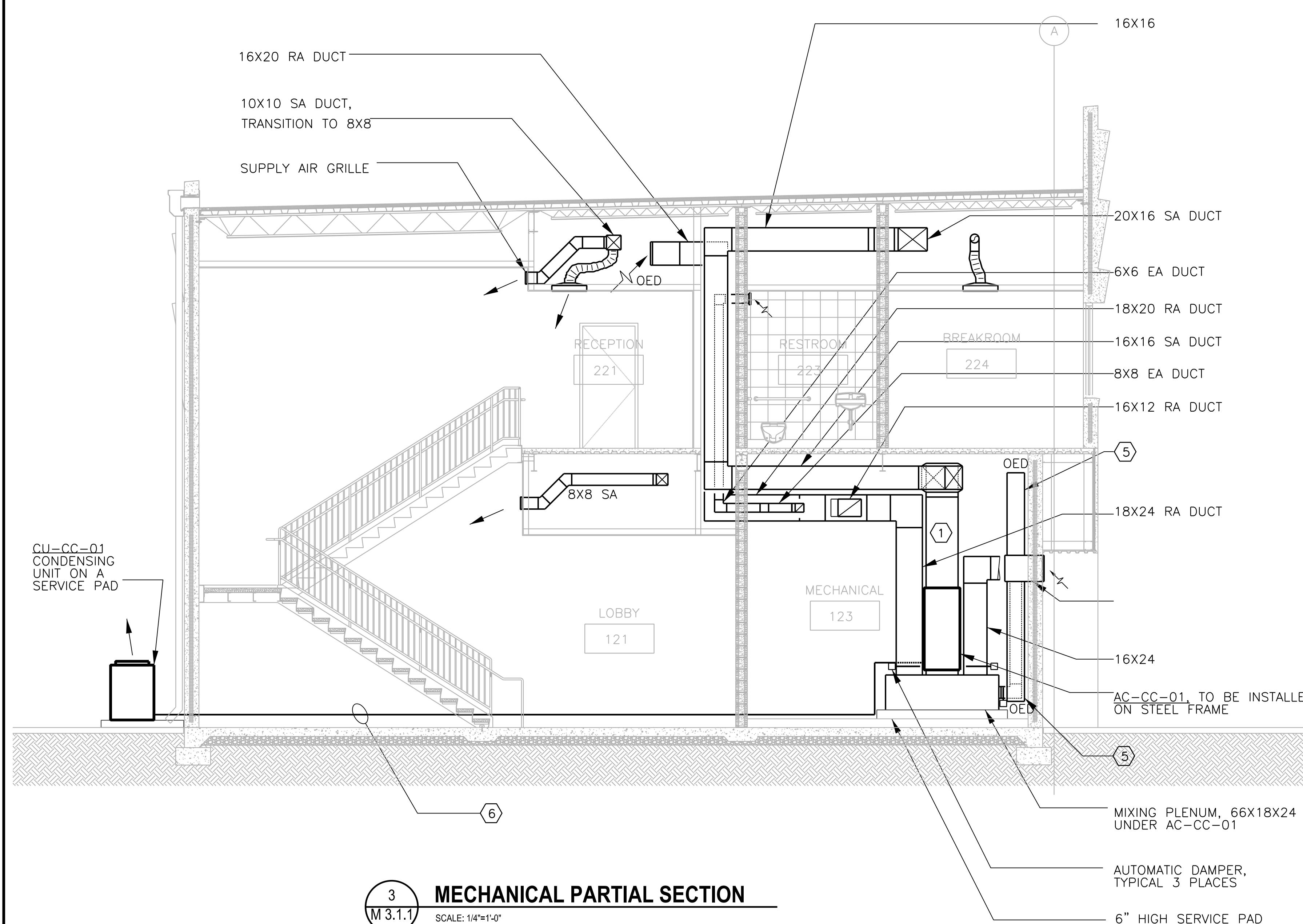
AIR CARGO BUILDING C, 100% CONSTRUCTION DOCUMENTS ISSUED FOR BID, NOVEMBER 25, 2014



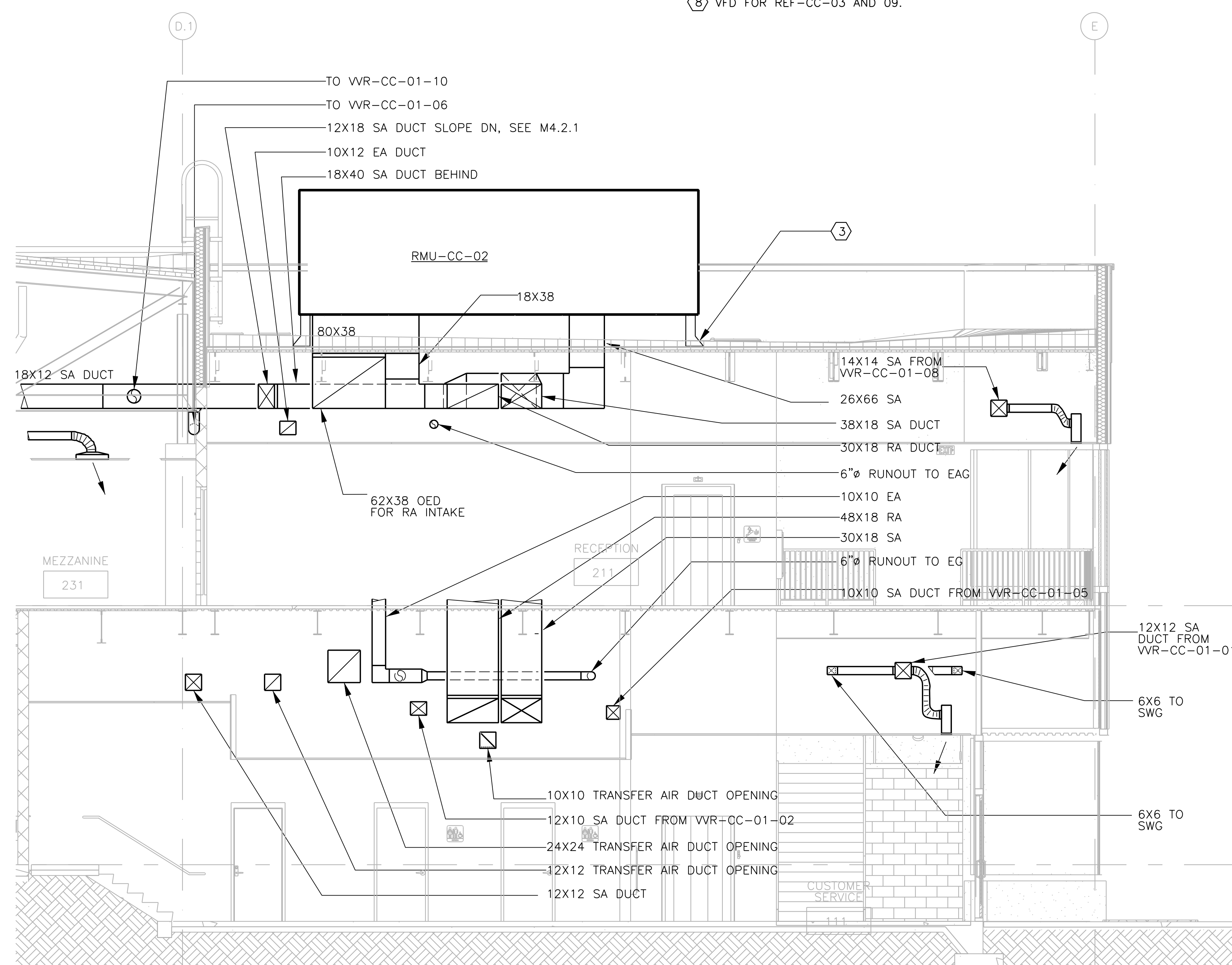
1 MECHANICAL LONGITUDINAL SECTION  
SCALE: 1/8"=1'-0"

#### KEYED NOTES

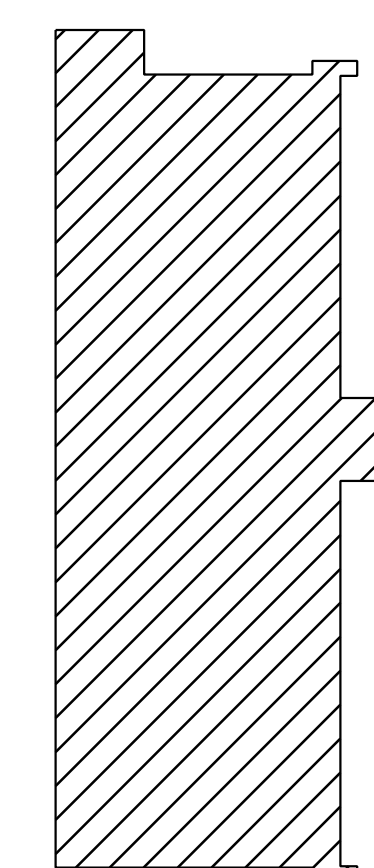
- DUCT SIZE PER AC-CC01 DISCHARGE OPENING.
- PROVIDE WITH BIRDSCREEN AT TEH DUCT INLET.
- ROOF CURB TO BE PROVIDED WITH ROOF TOP UNIT, SEE 1/M5.1.2.
- 18X36 COMBUSTION AIR INTAKE LOUVER WITH 8X24X36 PLENUM.
- PAIR OF 12"X12" COMBUSTION AIR DUCT 12" BELOW DECK AND 12" ABOVE FINISHED FLOOR.
- REFRIGERANT LINES TO BE ENCLOSED IN A SHEET METAL ENCLOSURE, SEE ARCH. SHEETS.
- COORDINATE GUARD RAIL LOCATIONS WITH ARCH. PLANS.
- VFD FOR REF-CC-03 AND 09.



3 MECHANICAL PARTIAL SECTION  
SCALE: 1/4"=1'-0"



2 MECHANICAL PARTIAL SECTION  
SCALE: 1/4"=1'-0"



KEY MAP  
NORTH

NO. DATE BY REVISION

AIR CARGO BUILDING C

MECHANICAL  
SECTIONS

WBS NUMBER:  
D.07.55.009  
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FC-6006007529-A  
A/E PROJECT NUMBER:  
HII-0730621

DRAWN BY:  
K. MILNER  
DESIGNED BY:  
R. ANWAR  
CHECKED BY:  
D. POPE  
APPROVED BY:  
R. ANWAR

DATE:  
11/25/2014

SCALE:  
AS NOTED

SHEET NO.:

M 3.1.1

SEAL

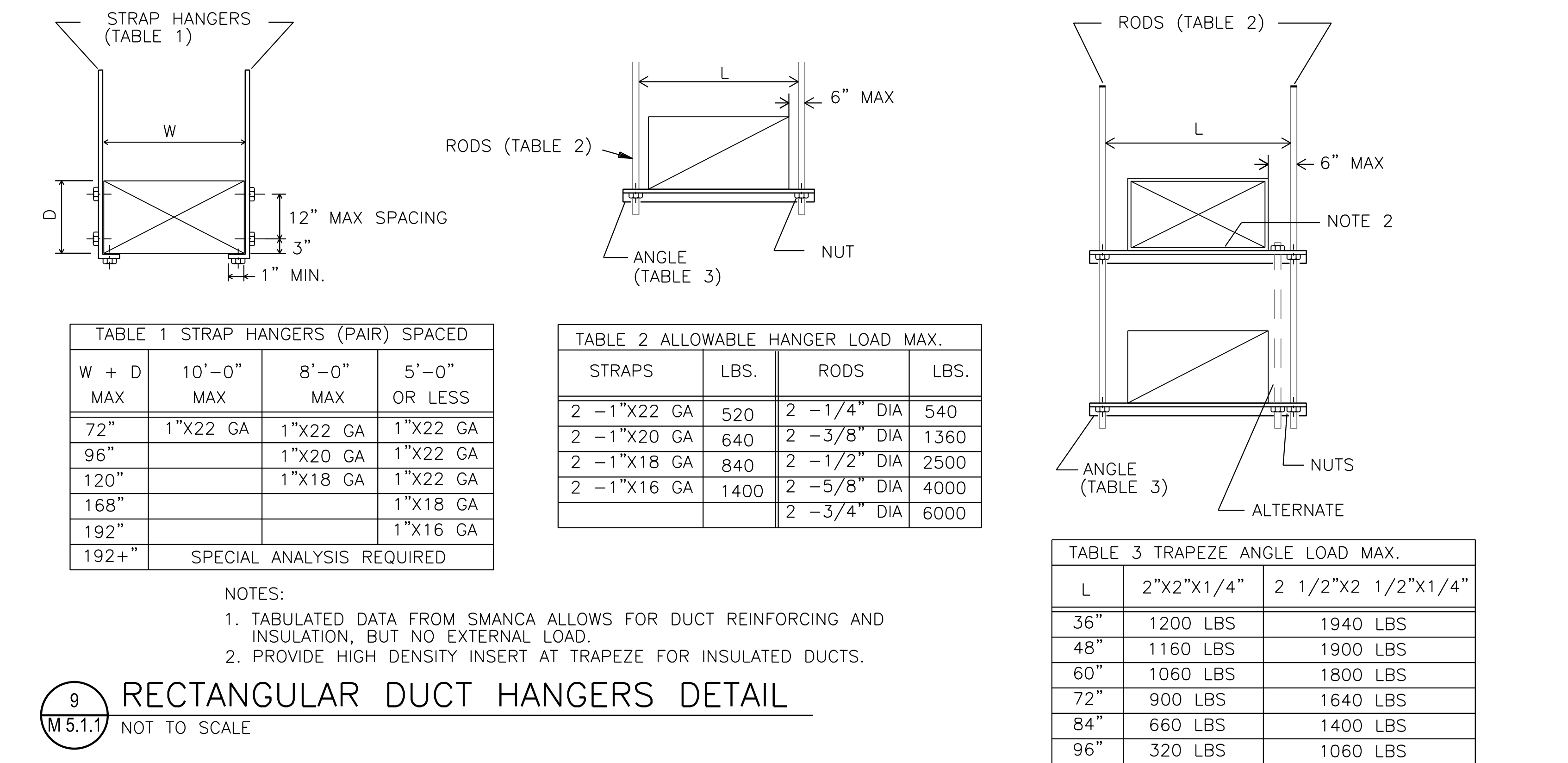
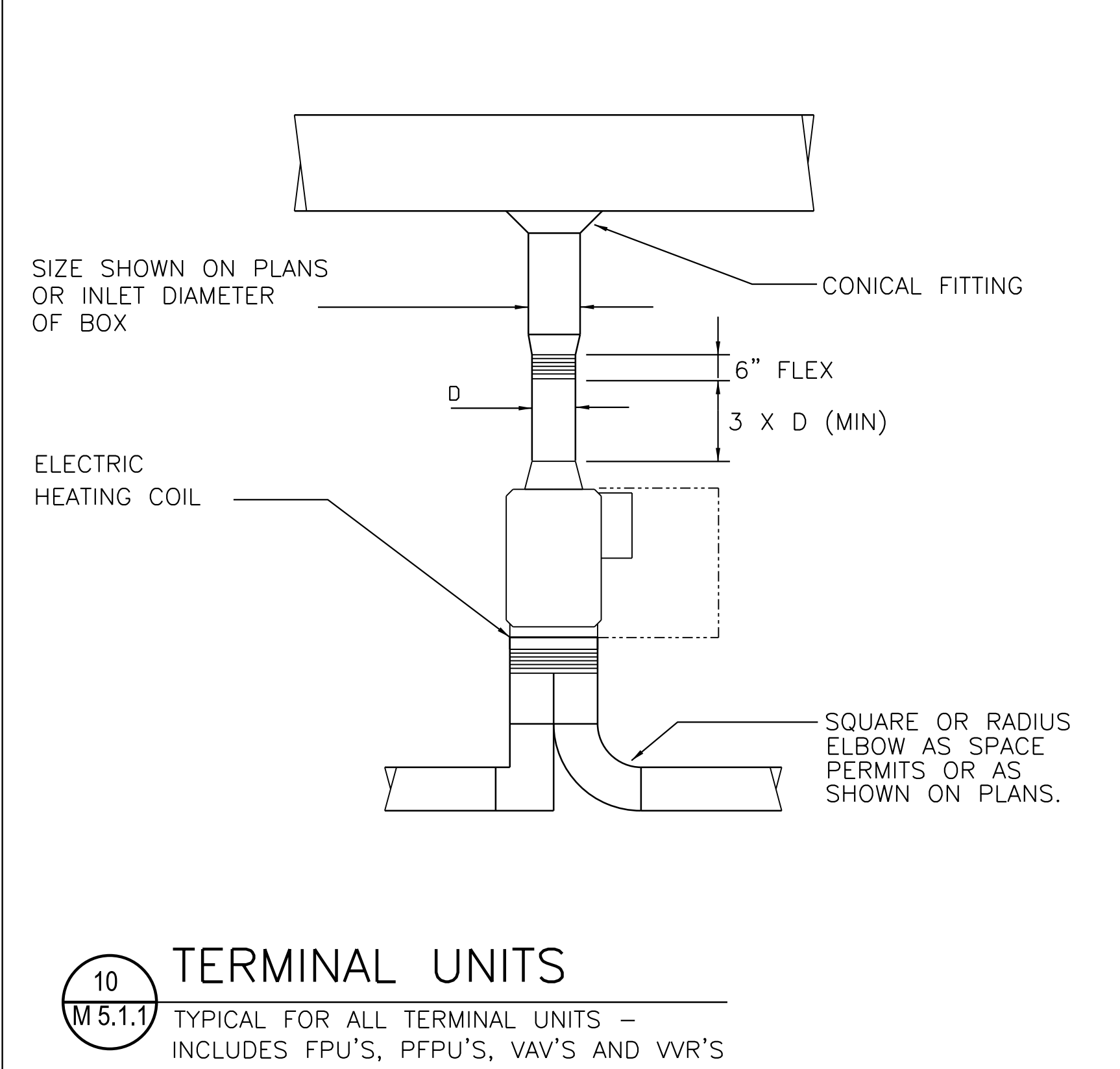
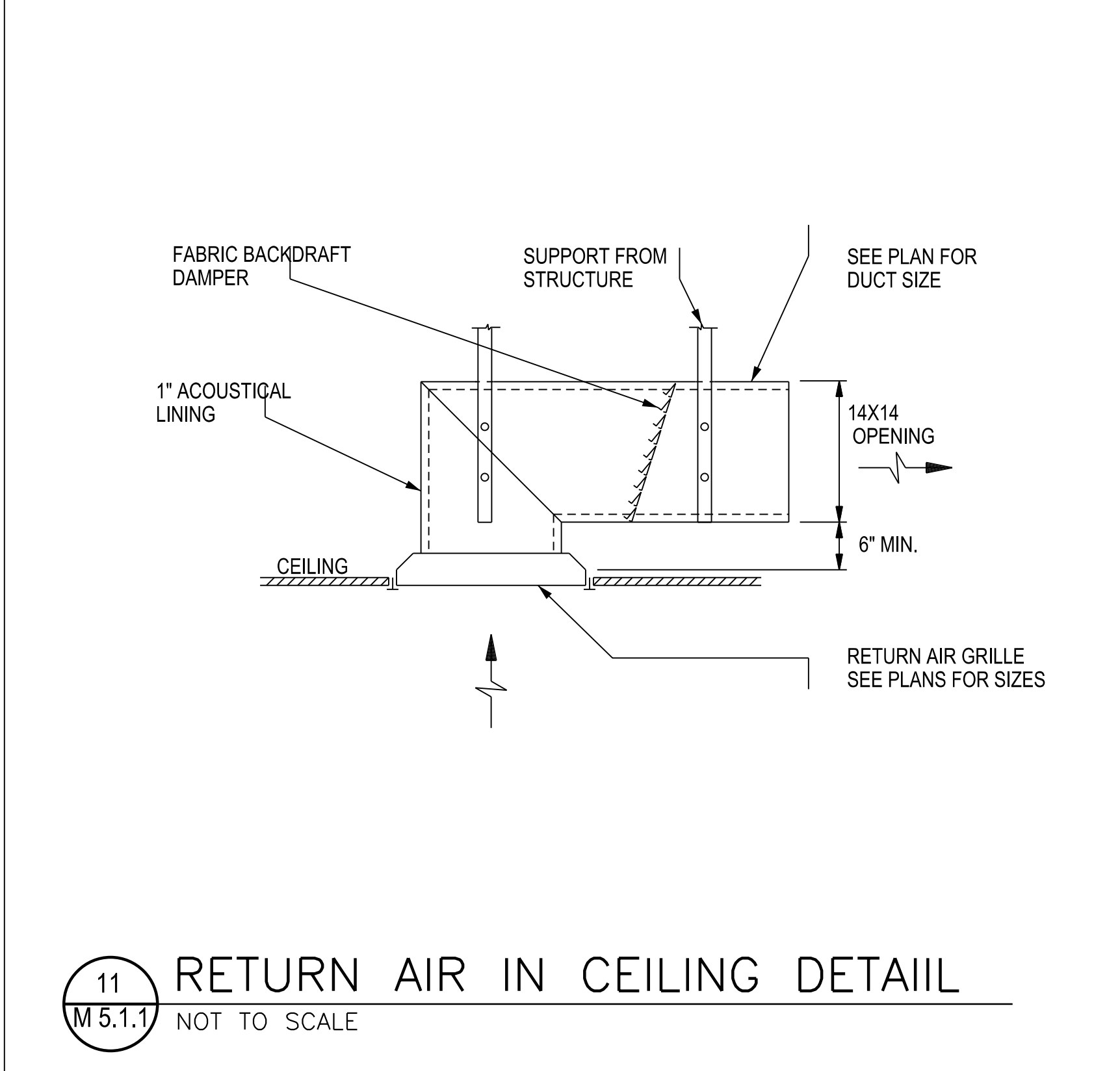
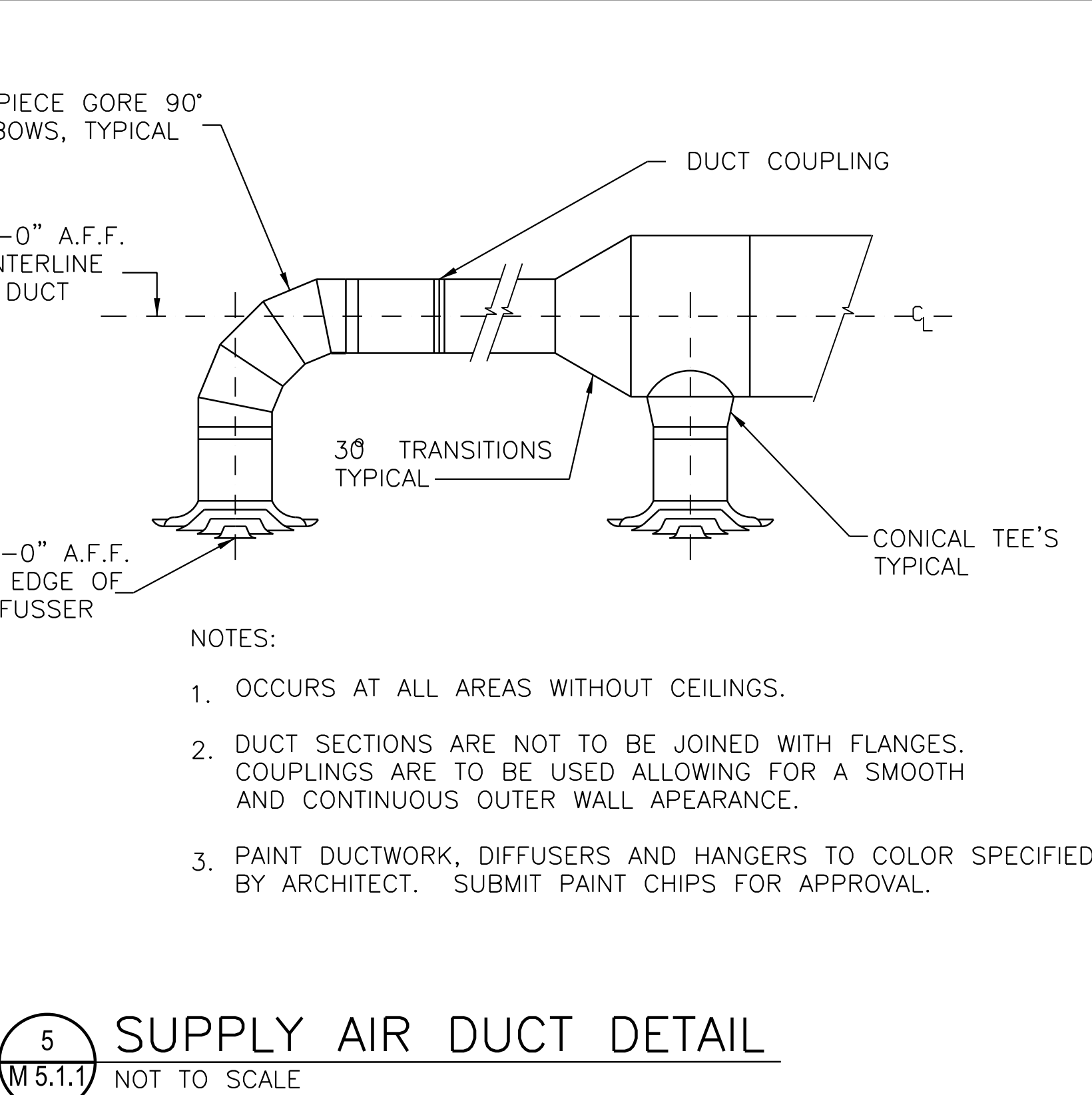
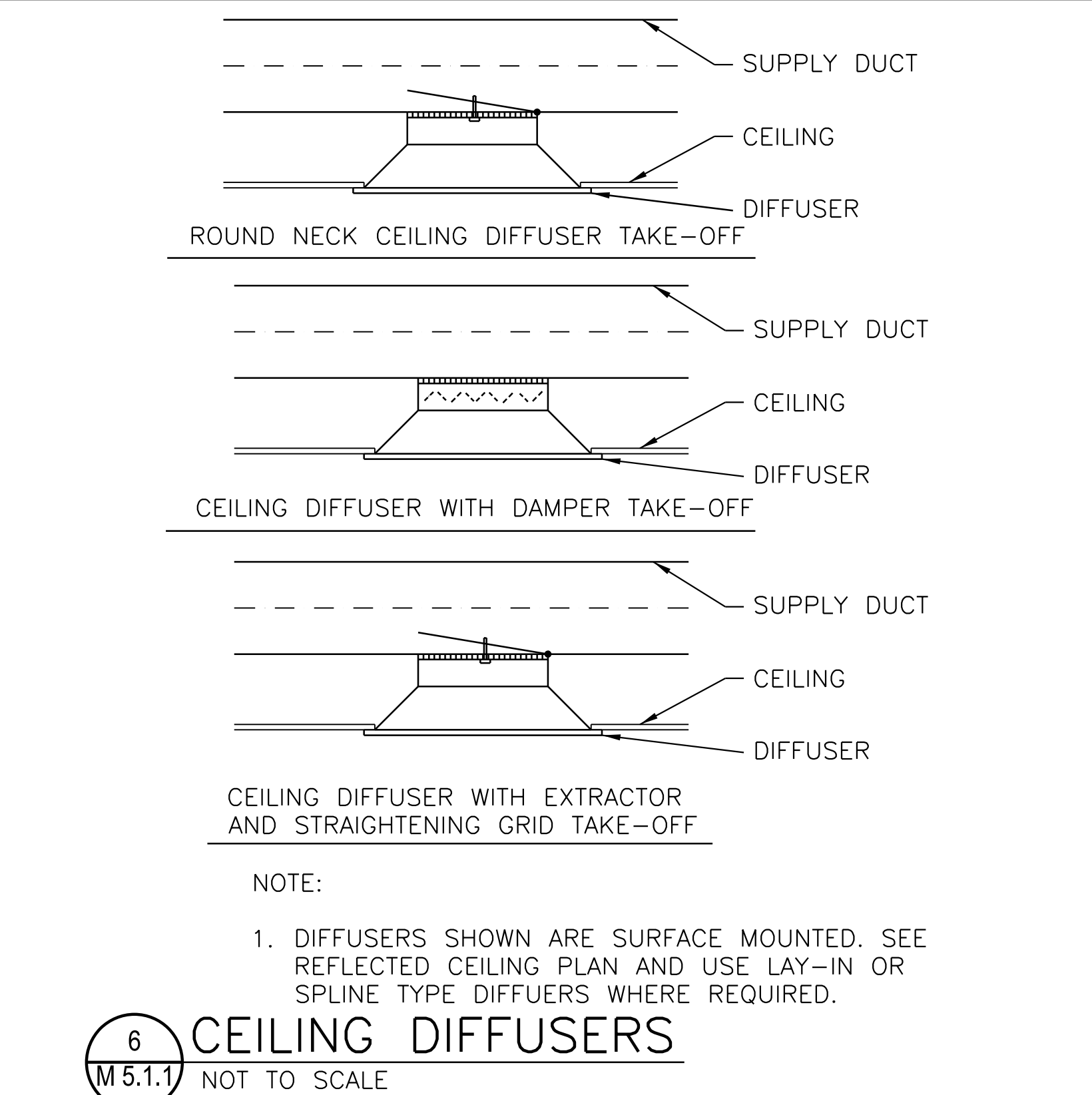
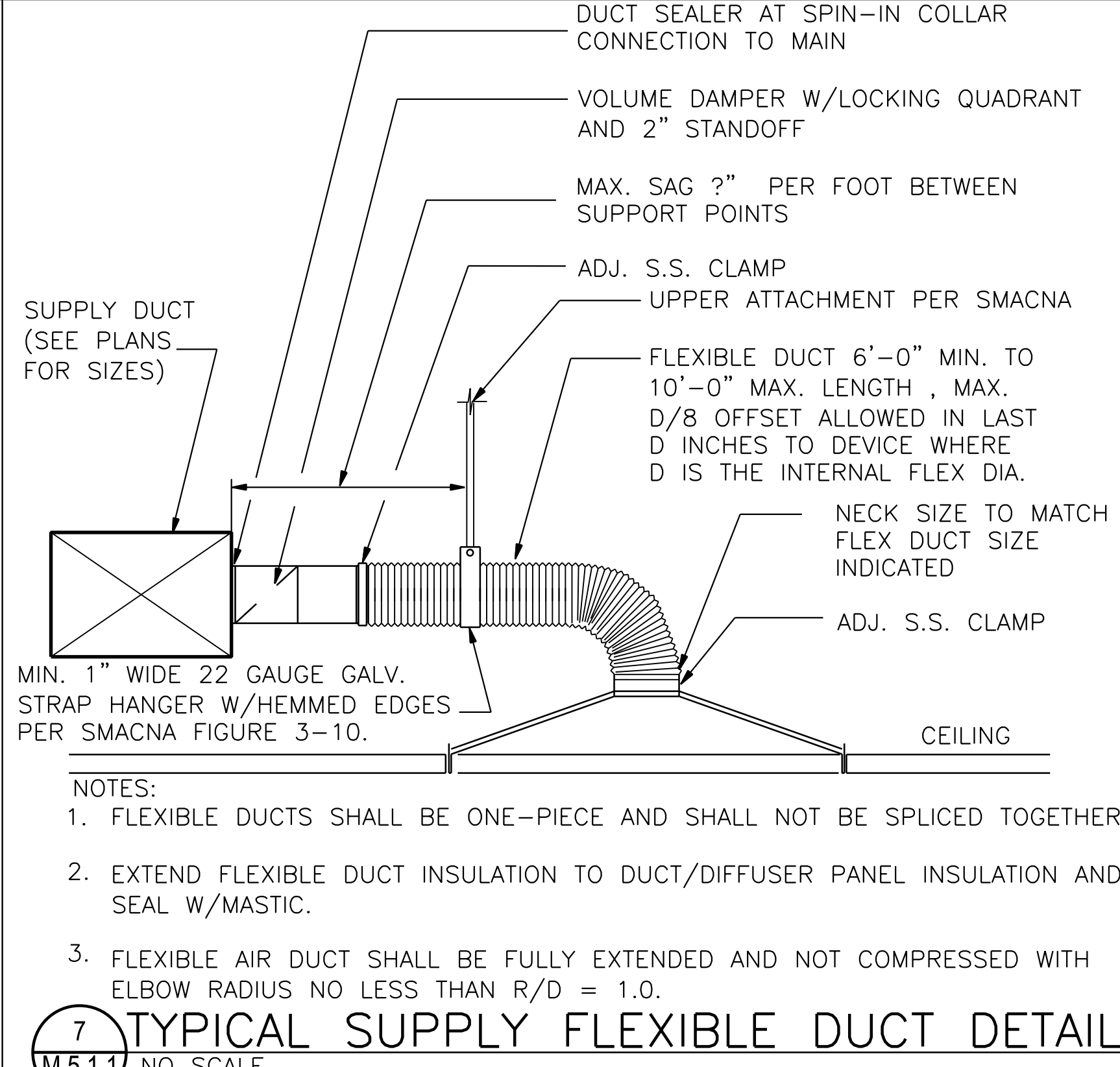
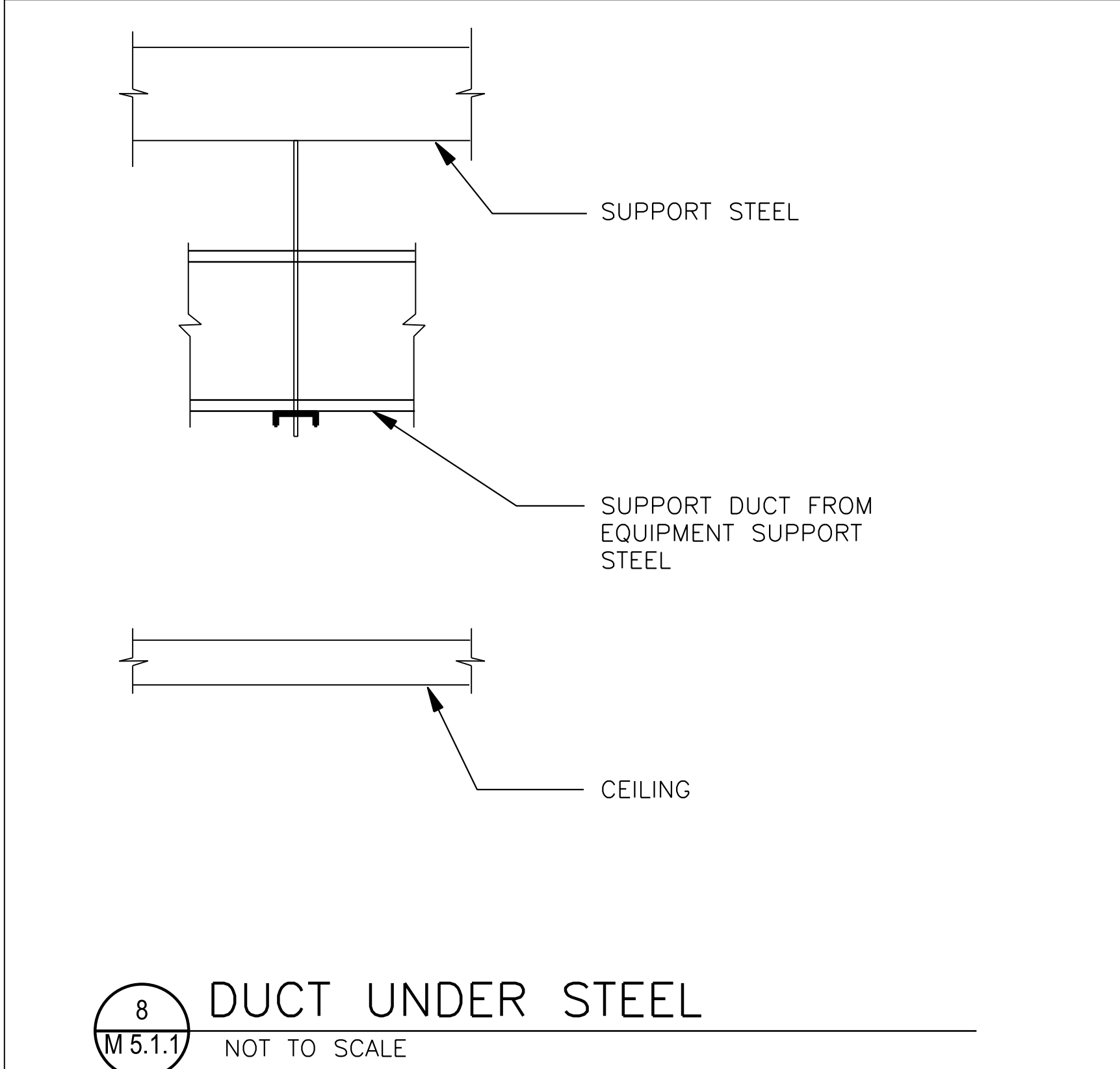
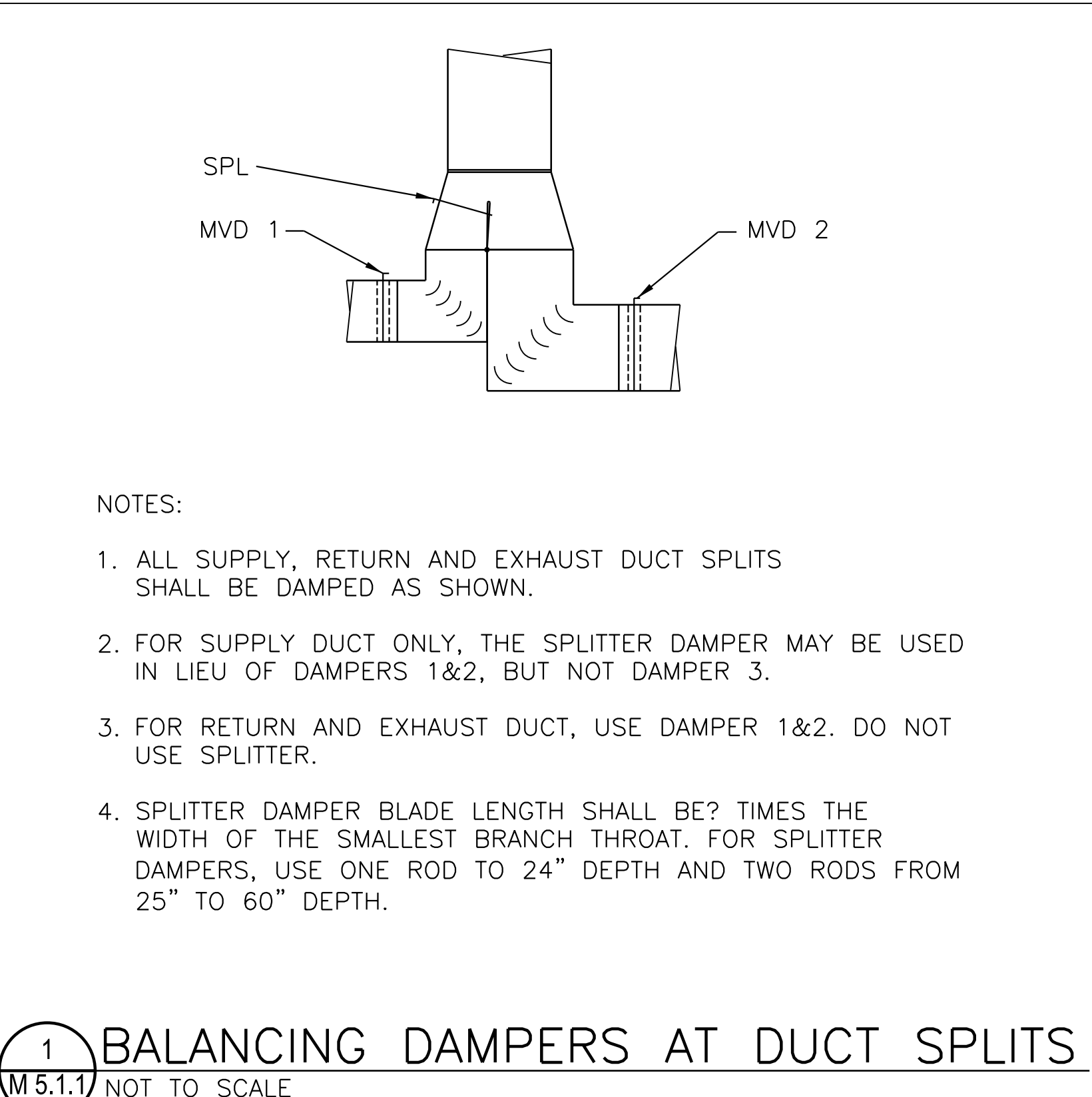
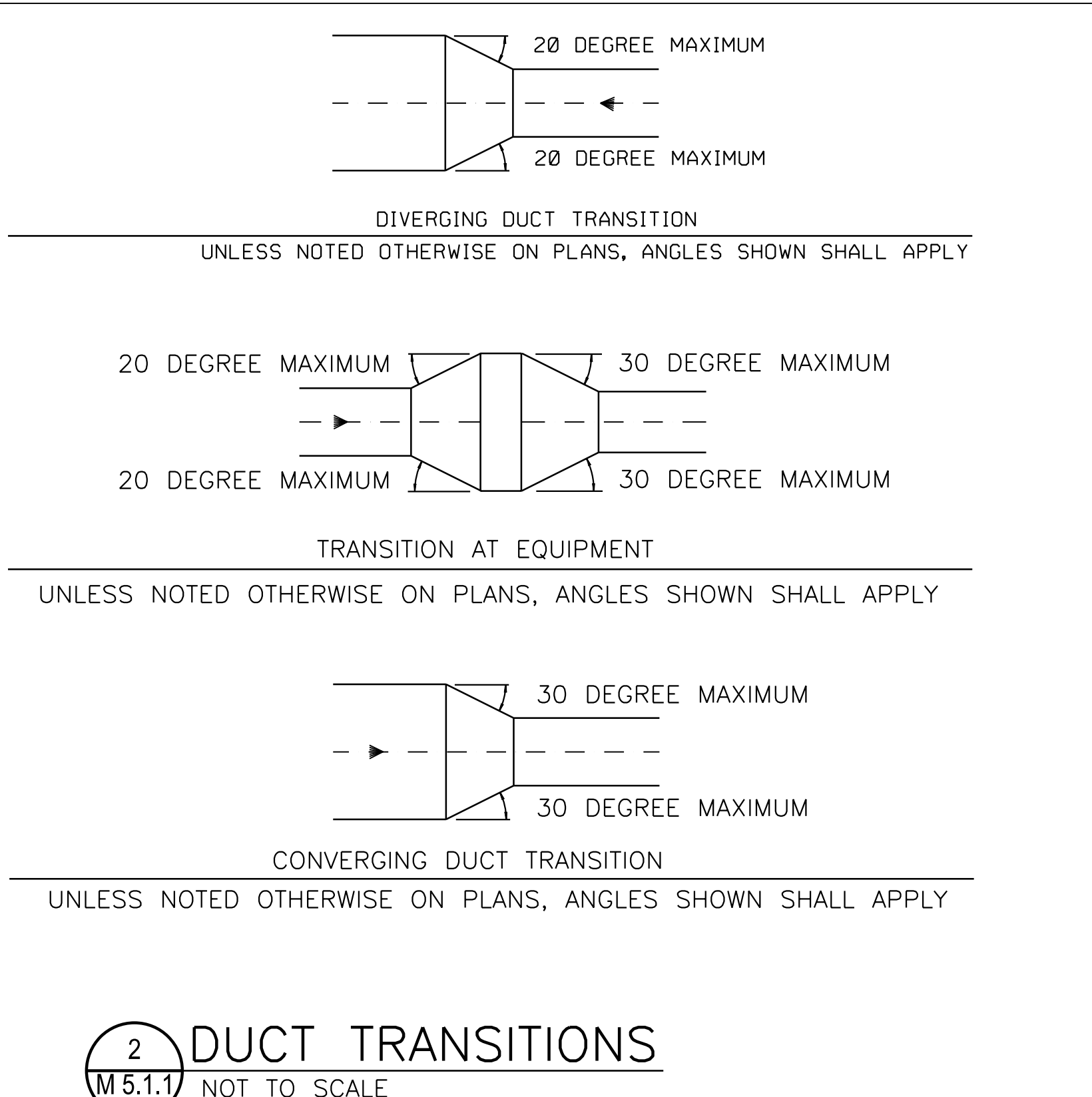
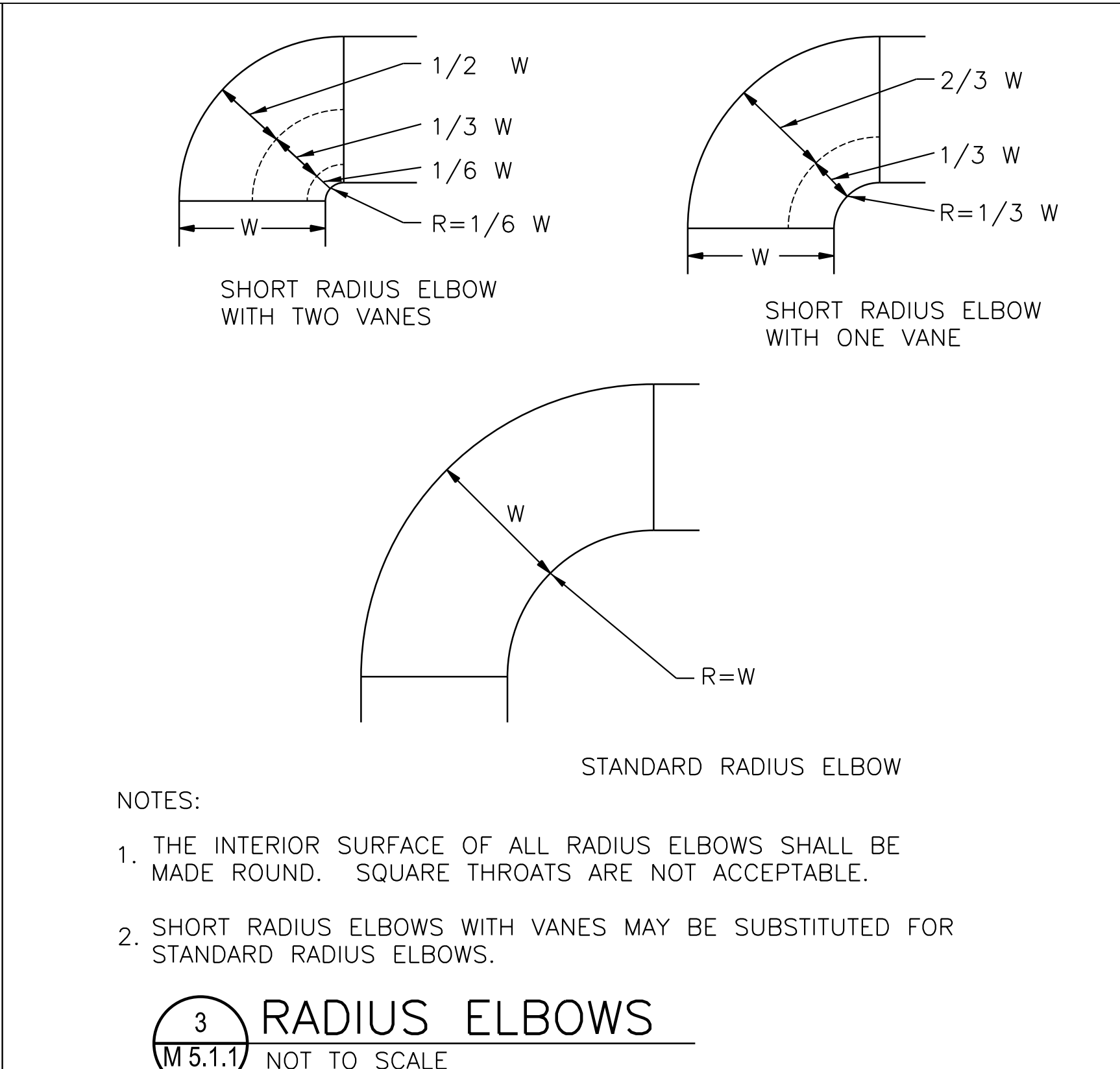
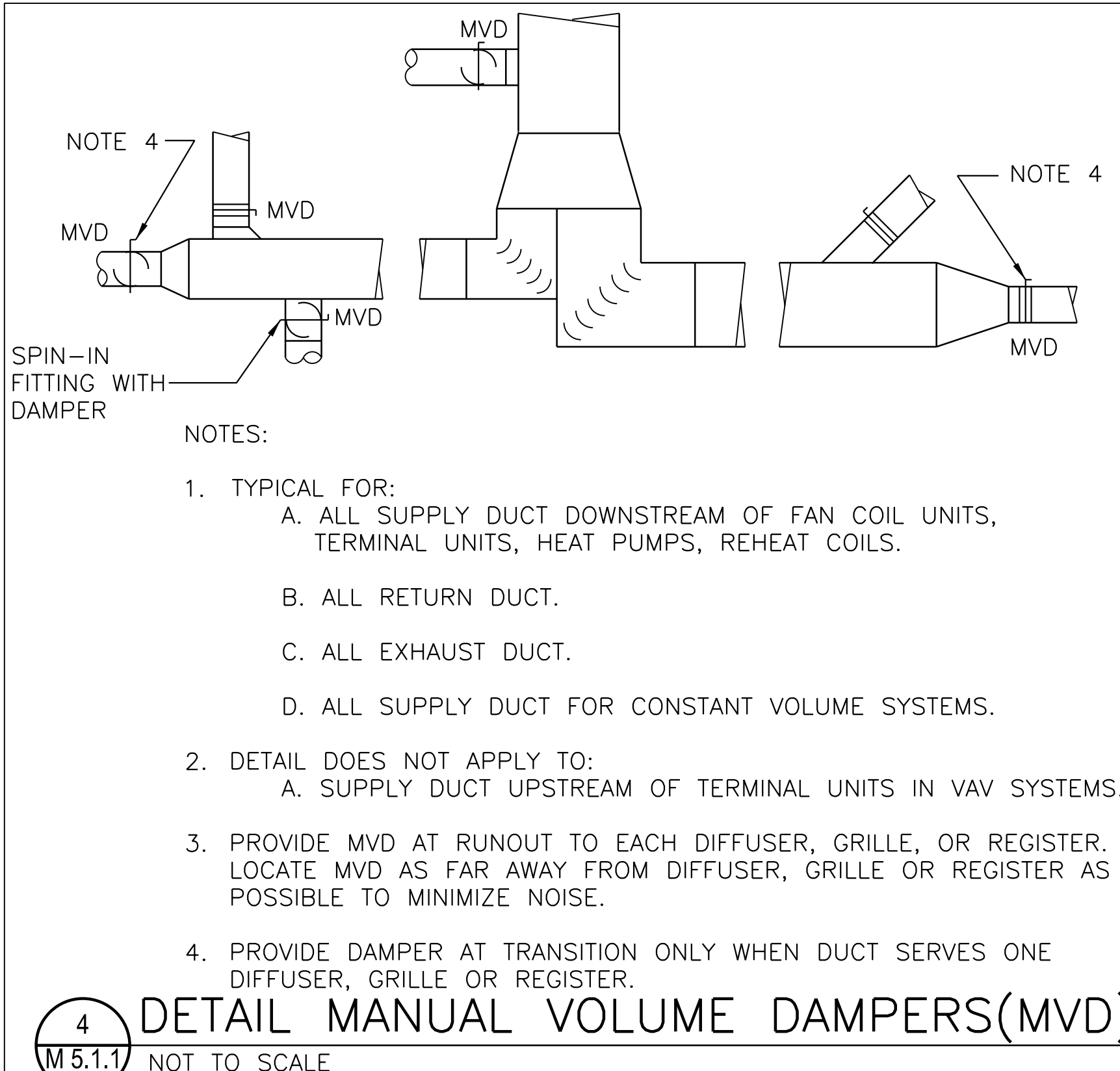
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HEERY INTERNATIONAL, INC. 969  
PEACHTREE STREET, NE  
ATLANTA, GA 30309  
PHONE: 404.418.9190  
FAX: 404.546.2017

MATROX 3D  
44 BROAD STREET  
ATLANTA, GA 30303  
PHONE: 404.522.3801  
FAX: 404.522.3823

STEVENS & WILKINSON, INC.  
100 PEACHTREE STREET NW, SUITE 2500  
ATLANTA, GA 30303  
PHONE: 404.522.0888  
FAX: 404.521.6204

SOUTHEASTERN ENGINEERING, INC. (SEI)  
2015 SANDY PLAINS ROAD  
MARIETTA, GA 30066  
PHONE: 770.321.9008  
FAX: 770.321.3905

NO. DATE BY REVISION

AIR CARGO BUILDING C

MECHANICAL  
DETAILS

WBS NUMBER:  
D.07.55.009

DRAWN BY:  
K. MILNER

FC NUMBER:  
FC-6006007529-A

DESIGNED BY:  
R. ANWAR

A/E PROJECT NUMBER:  
HIL-0730621

CHECKED BY:  
D. POPE

APPROVED BY:  
R. ANWAR

DATE:  
11/25/2014

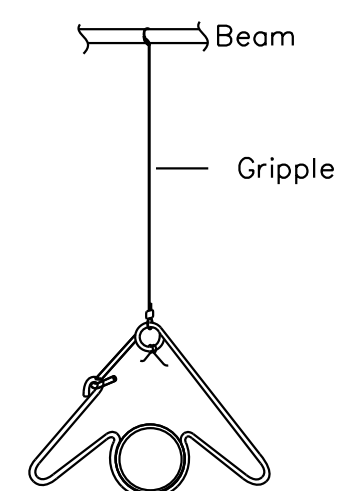
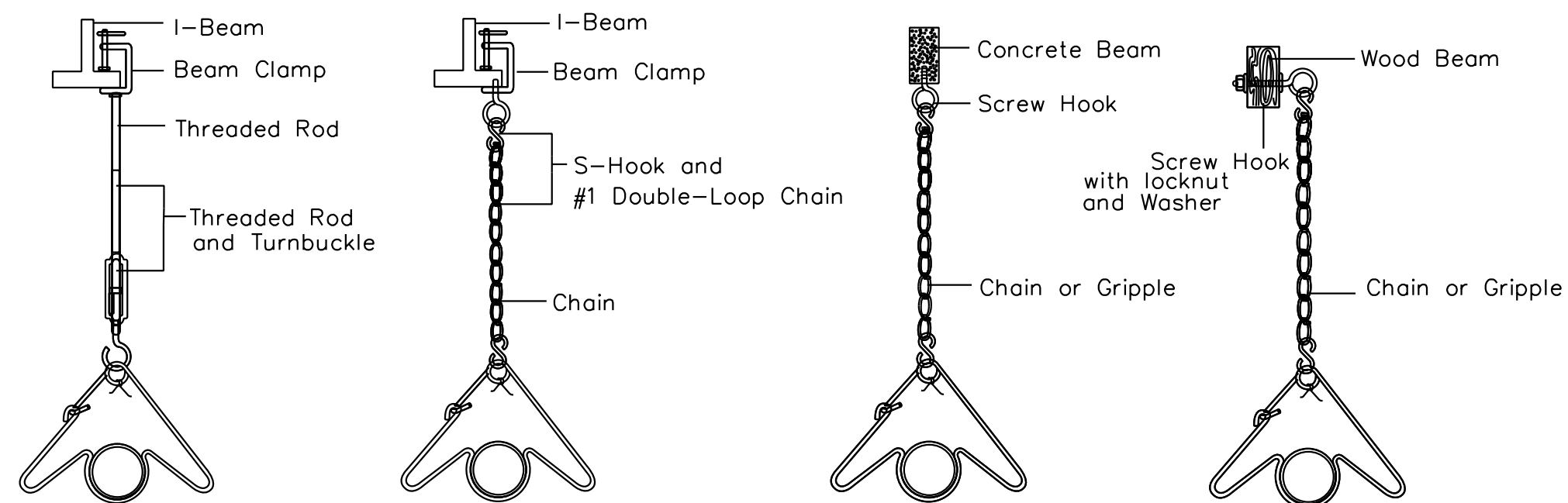
SCALE:  
AS NOTED

SHEET NO:  
M 5.1.1

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AIR CARGO BUILDING C, 100% CONSTRUCTION DOCUMENTS ISSUED FOR BID, NOVEMBER 25, 2014

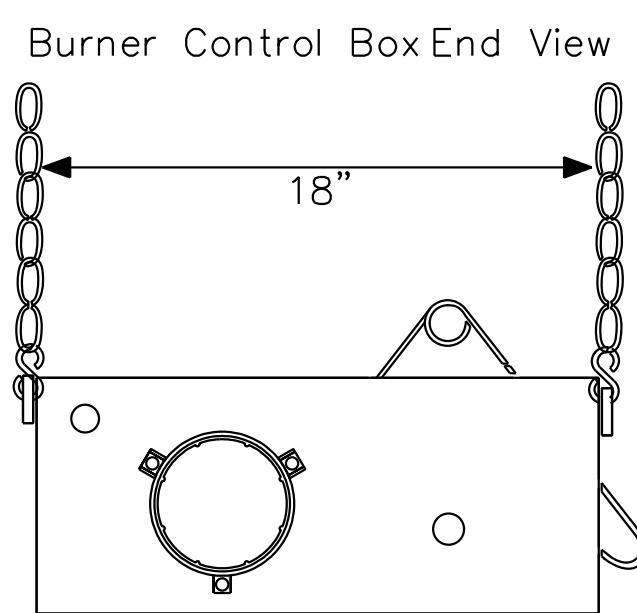
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Typical Suspension Details

NOTE:

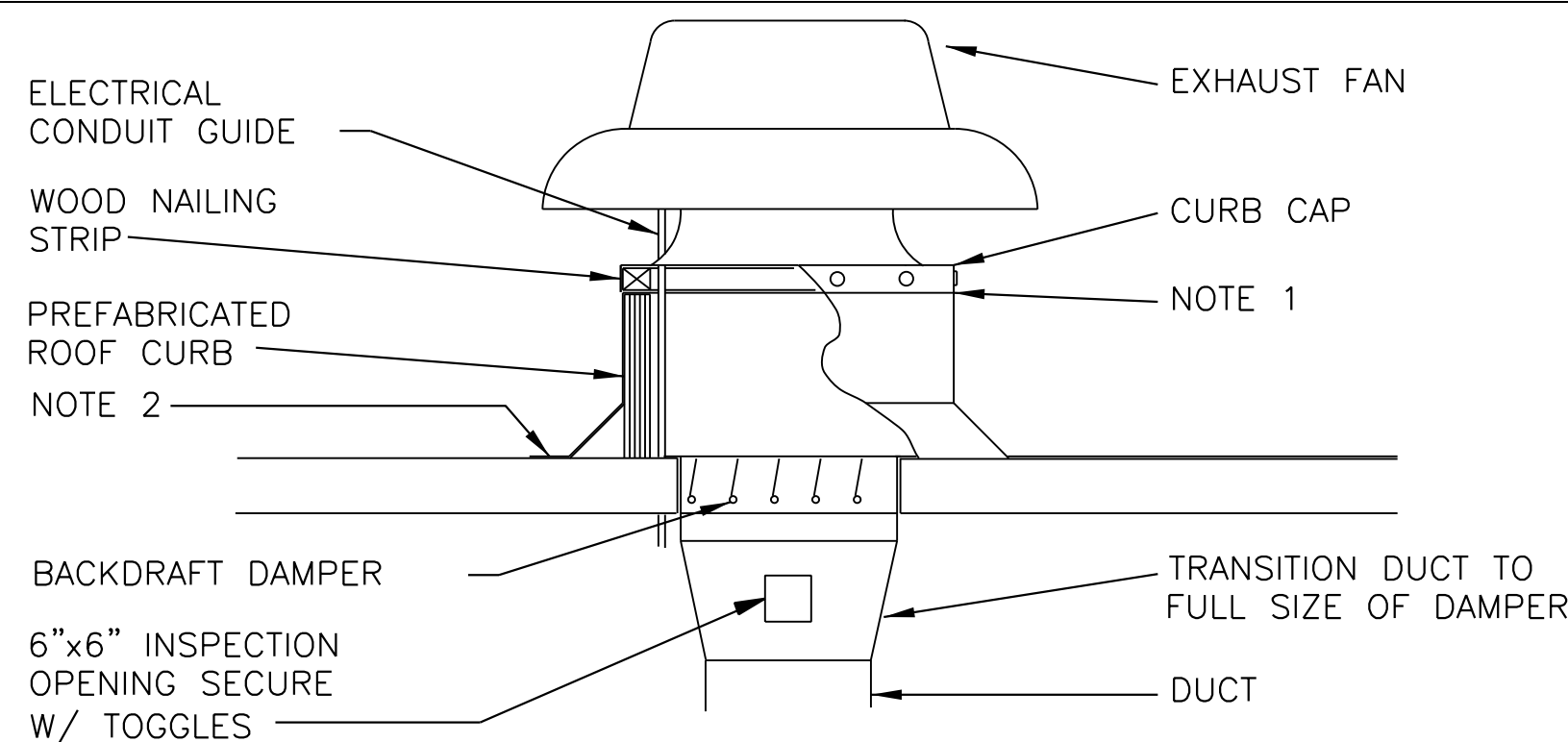
PROVIDE SUPPLEMENTAL STEEL TO BRACE AND STABILIZE HEATERS AND GAS PIPING. COORDINATE WITH MFG. INSTALLATION REQUIREMENTS.



Burner Control Box Assembly

### 3 RADIANT HEATER DETAILS

M 5.1.2 NOT TO SCALE

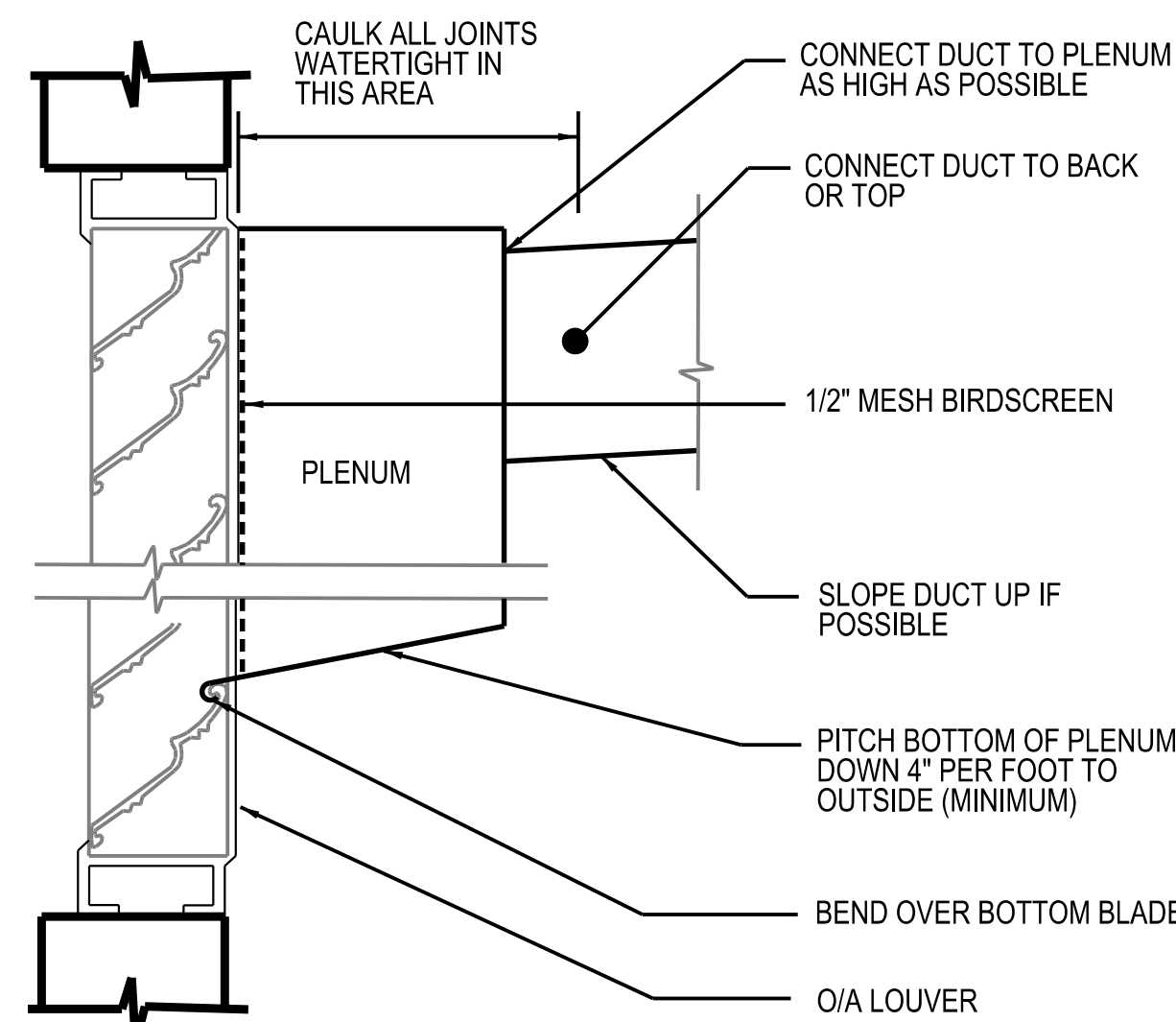


NOTES:

1. SECURE HOOD TO WOOD NAILING STRIP WITH  $\frac{3}{8}$ " CADMIUM PLATED LAG BOLTS NOT OVER 12" ON CENTER.
2. SECURE ROOF CURB, DUCTWORK AND DAMPER TO ROOF WITH EXPANSION BOLTS (CONCRETE ROOF) OR RUST RESISTANT BOLTS (METAL DECK & BAR JOIST ROOF).
3. SIZE OF DUCT THROUGH ROOF SHALL NOT BE LARGER THAN CURB SUPPLIED WITH HOOD.
4. RUN ELECTRICAL LINES THROUGH CLEARANCE HOLE PROVIDED IN GRAVITY DAMPER AND THROUGH VENTILATOR CONDUIT GUIDE.
5. DETAIL DOES NOT APPLY TO RANGE HOOD, DISHWASHER AND CART WASHER HOODS.

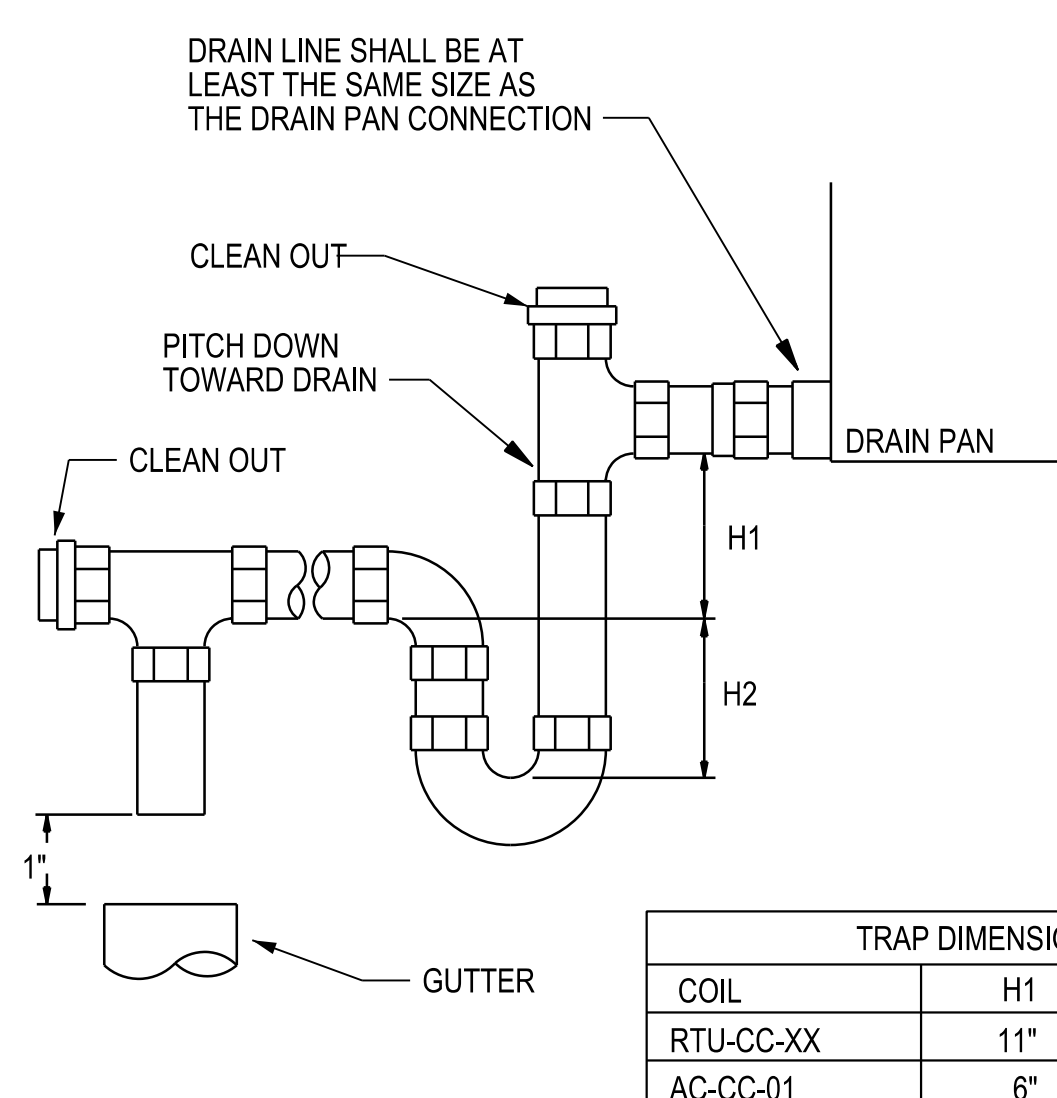
### 7 ROOF MOUNTED EXHAUST FAN DETAIL

M 5.1.2 NOT TO SCALE



### 6 DUCT CONNECTION TO WATERPROOF LOUVER

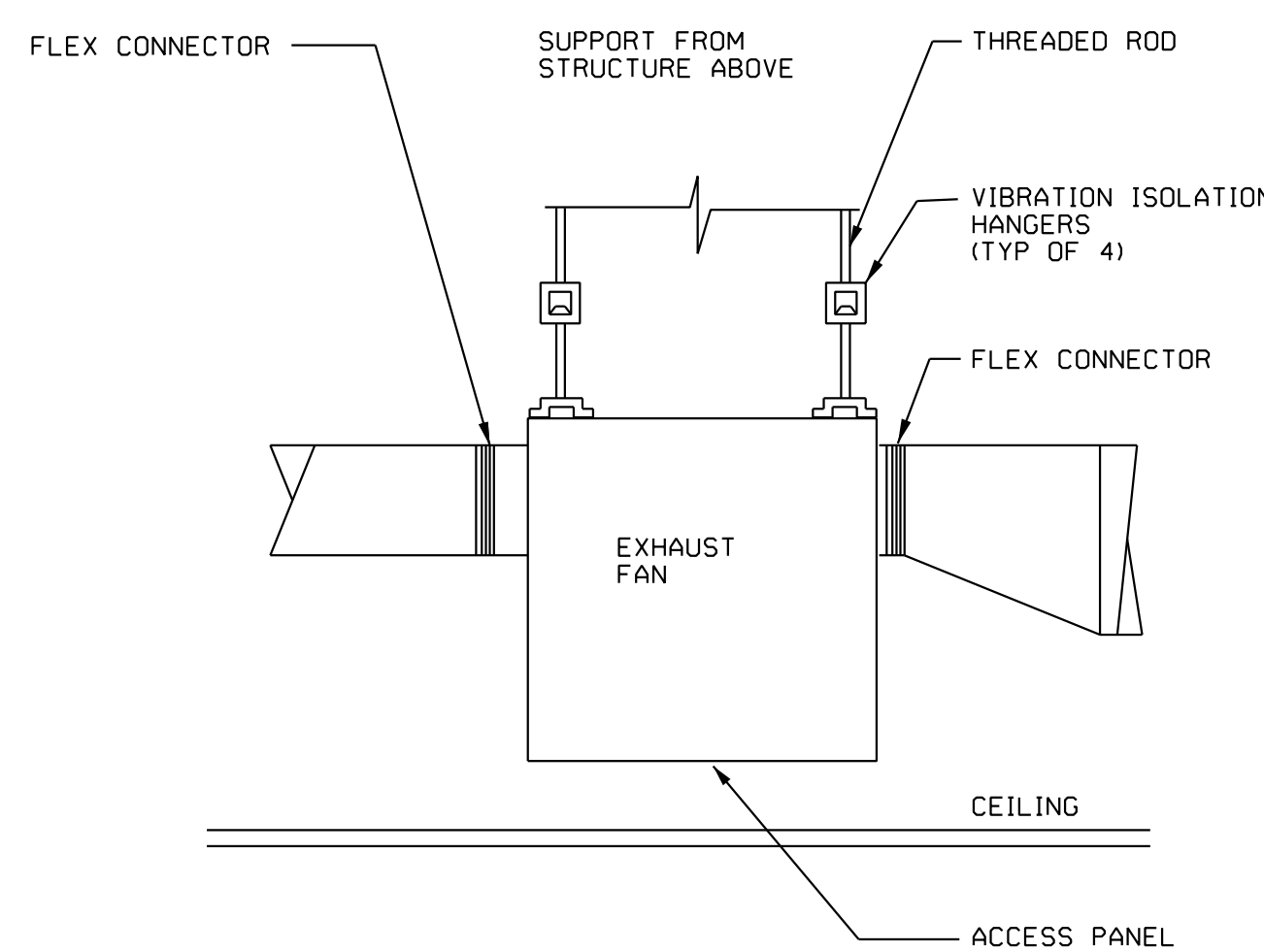
M 5.1.2 NOT TO SCALE



TRAP DIMENSIONS		
COIL	H1	H2
RTU-CC-XX	11"	2"
AC-CC-01	6"	2"

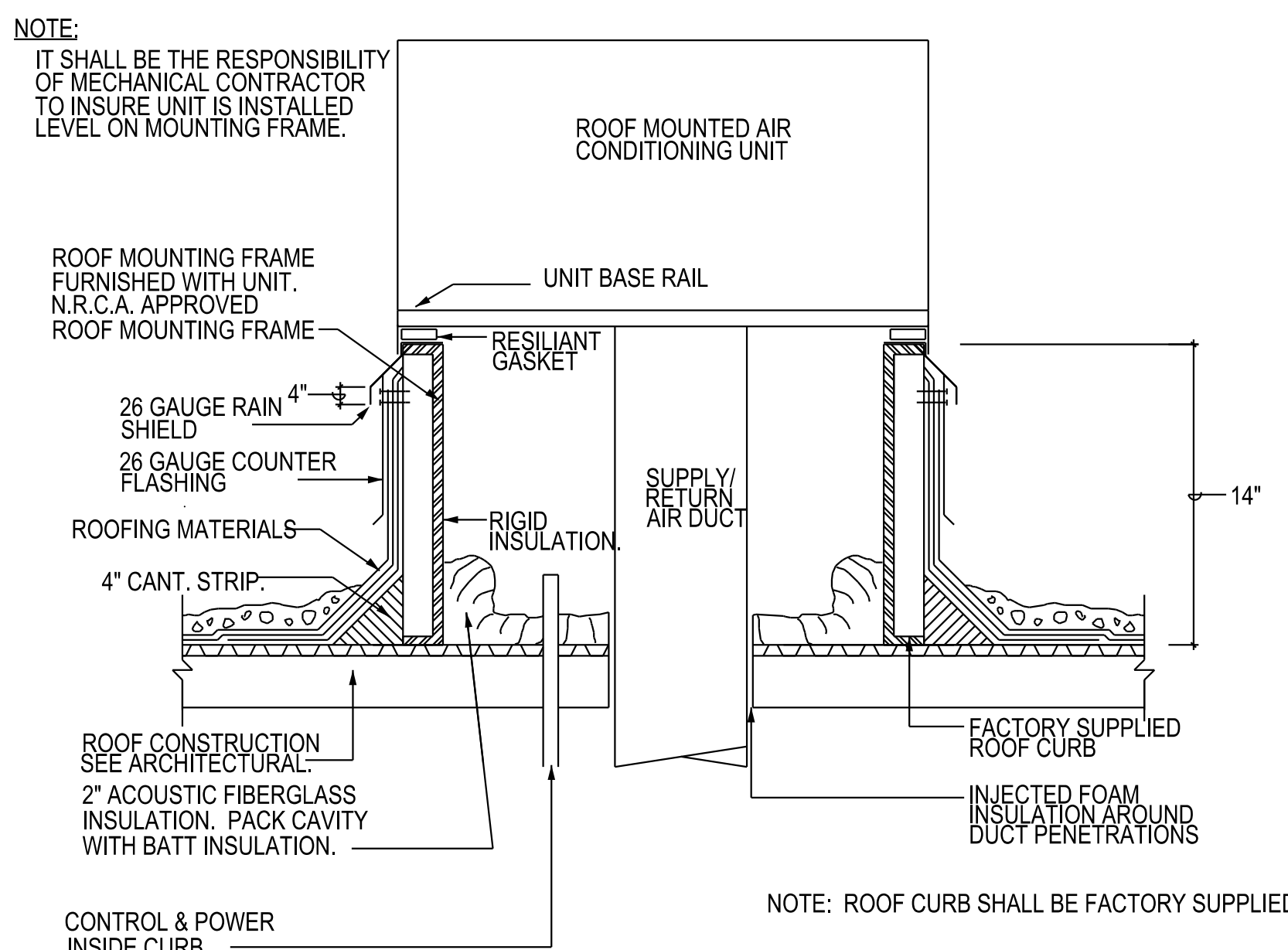
### 2 CONDENSATE DRAIN TRAP DETAIL

M 5.1.2 NOT TO SCALE



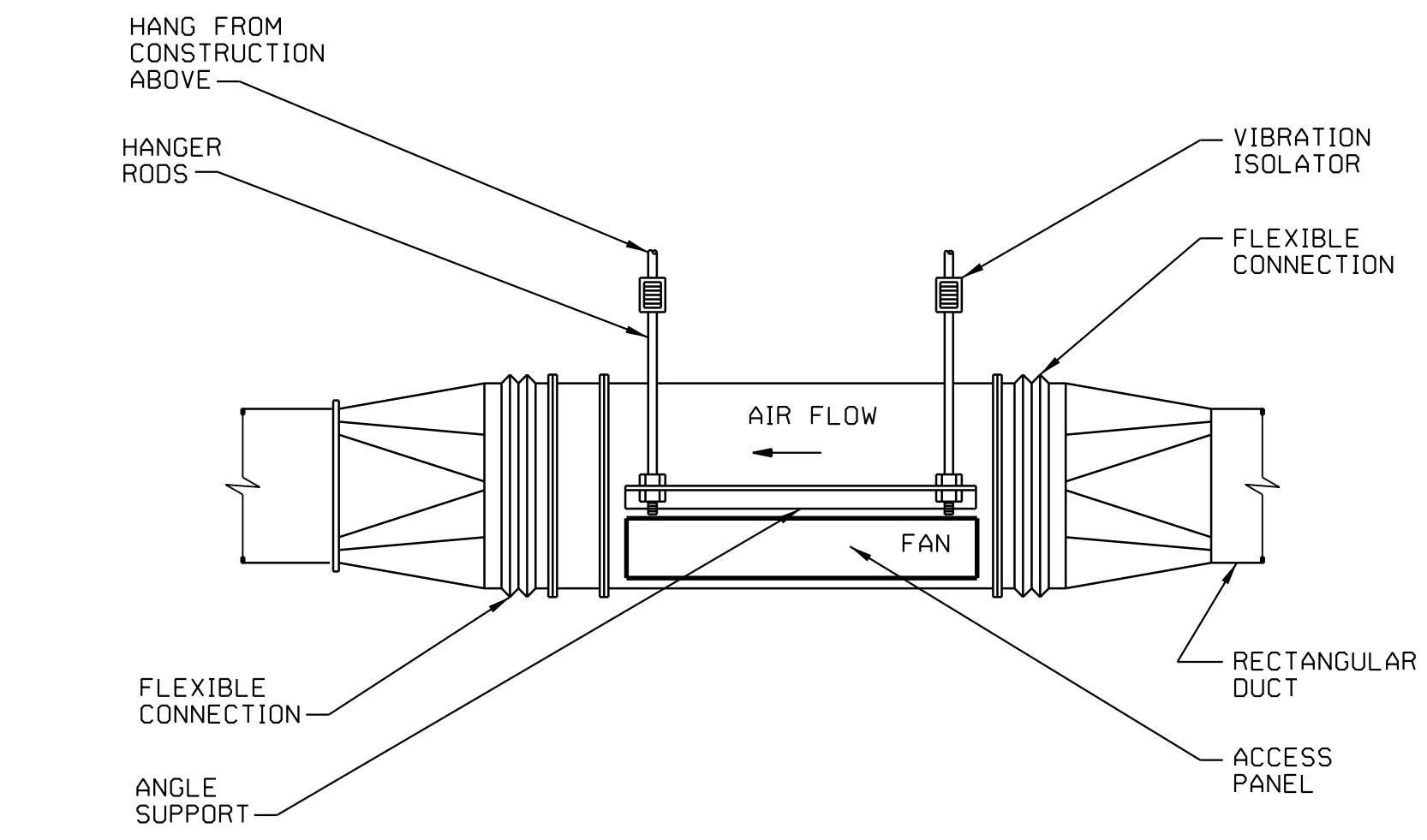
### 5 IN-LINE CABINET EXHAUST FAN DETAIL

M 5.1.2 NOT TO SCALE



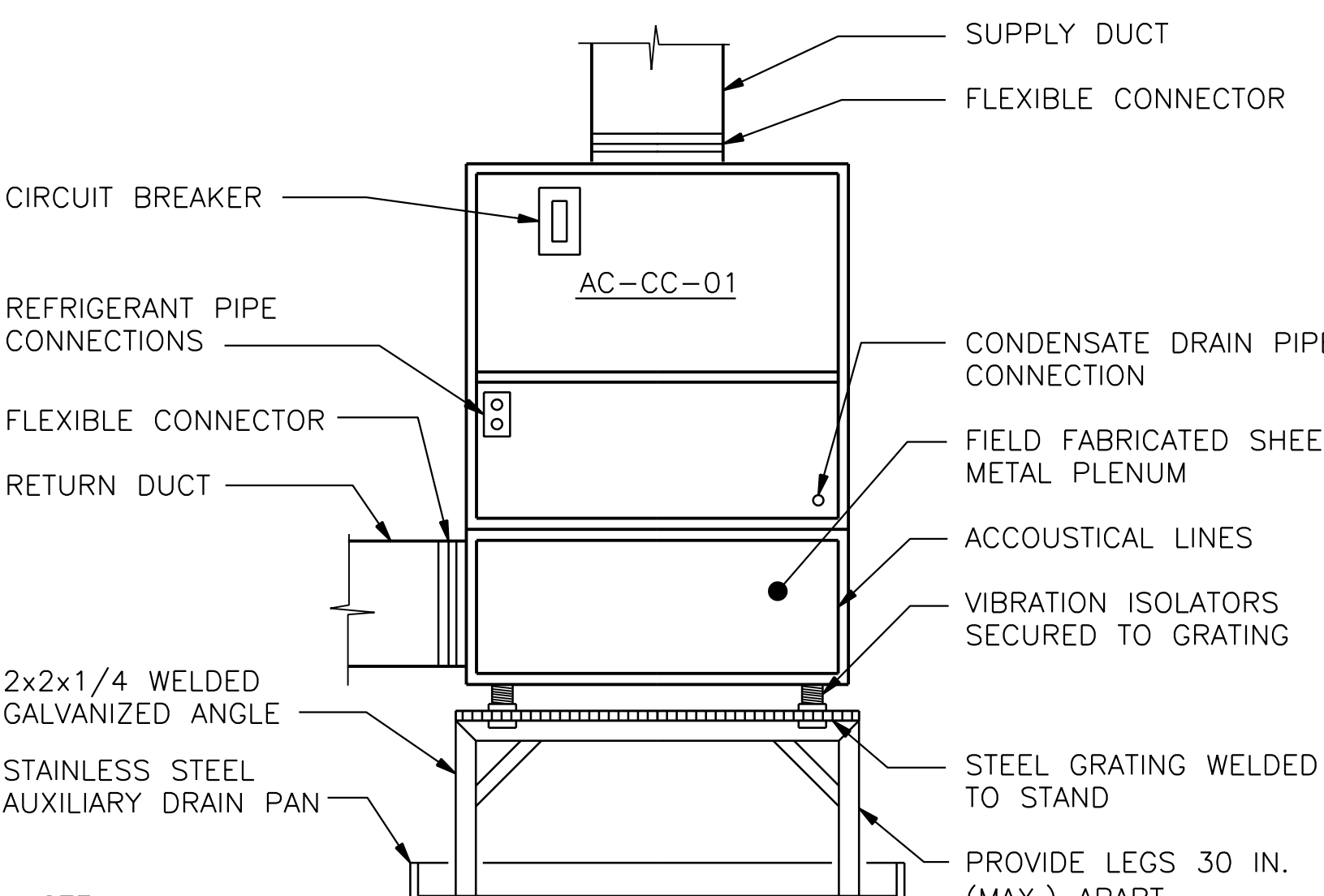
### 1 ROOF CURB MOUNTING DETAIL

M 5.1.2 NOT TO SCALE



### 4 HORIZONTAL IN-LINE FAN DETAIL

M 5.1.2 NOT TO SCALE

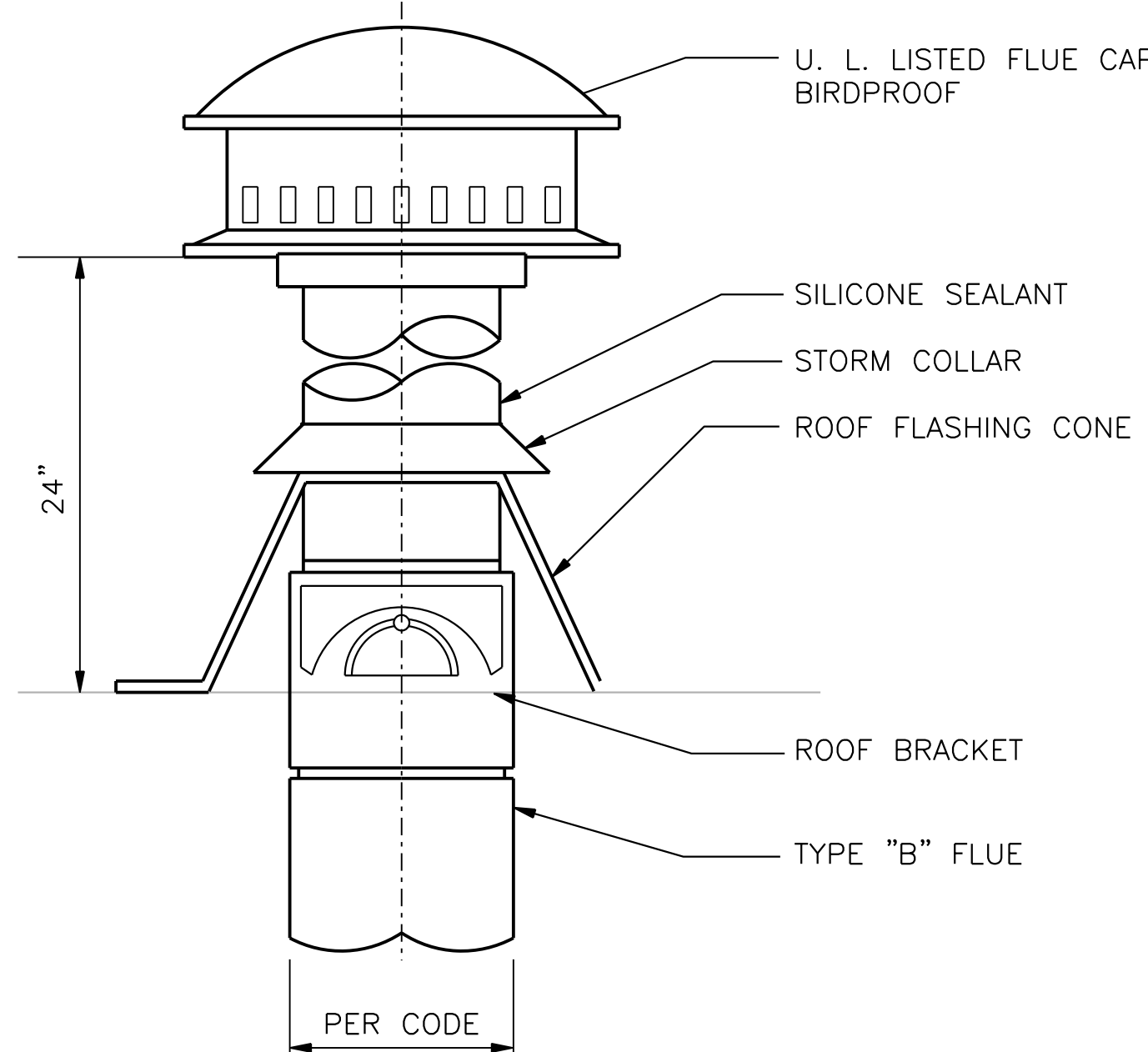


NOTE:

MAXIMUM HEIGHT OF STAND AND PLENUM SHALL NOT EXCEED 12".

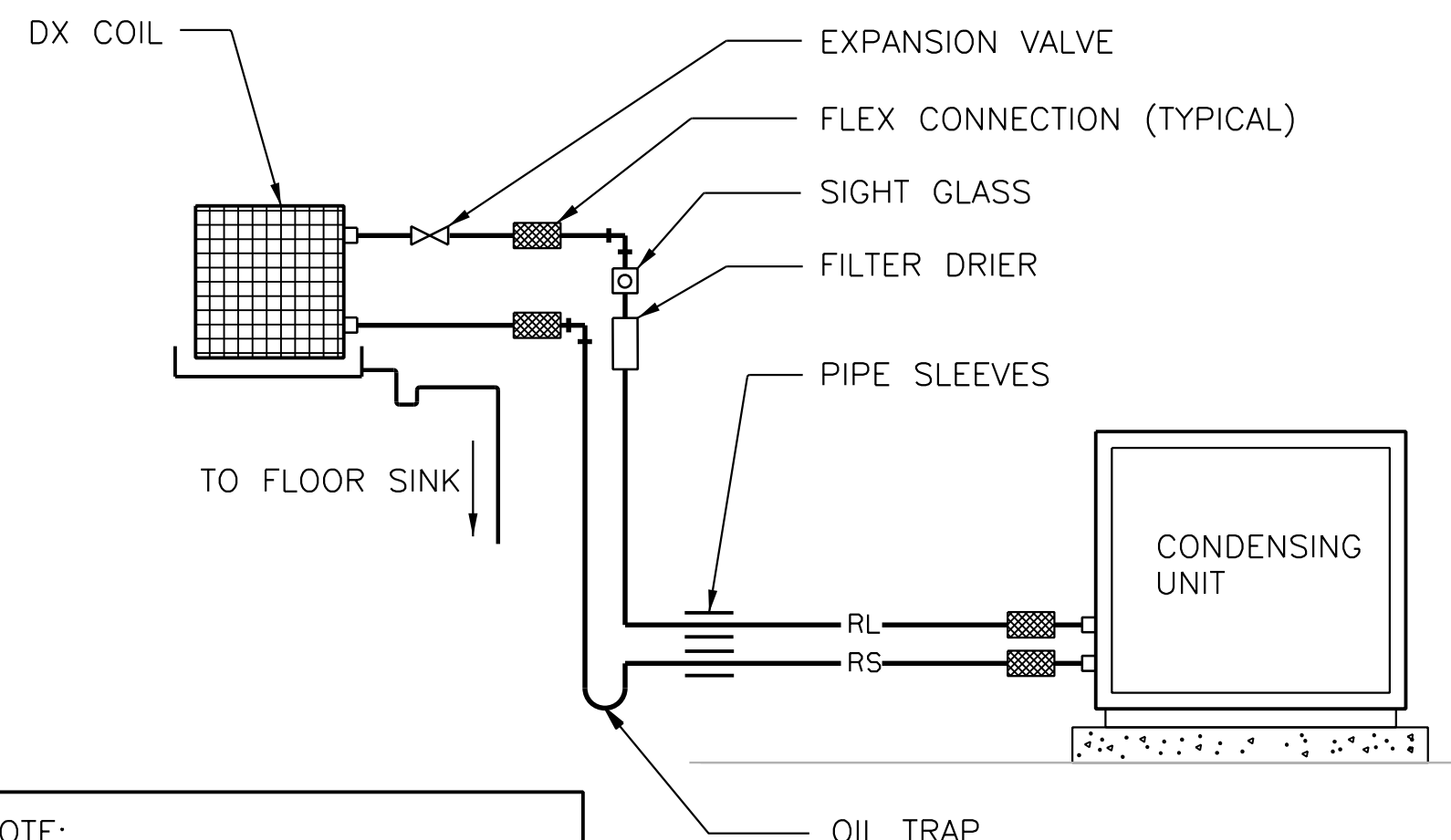
### 11 AC UNIT SUPPORT DETAIL

M 5.1.2 NOT TO SCALE



### 10 FLUE TO ROOF DETAIL

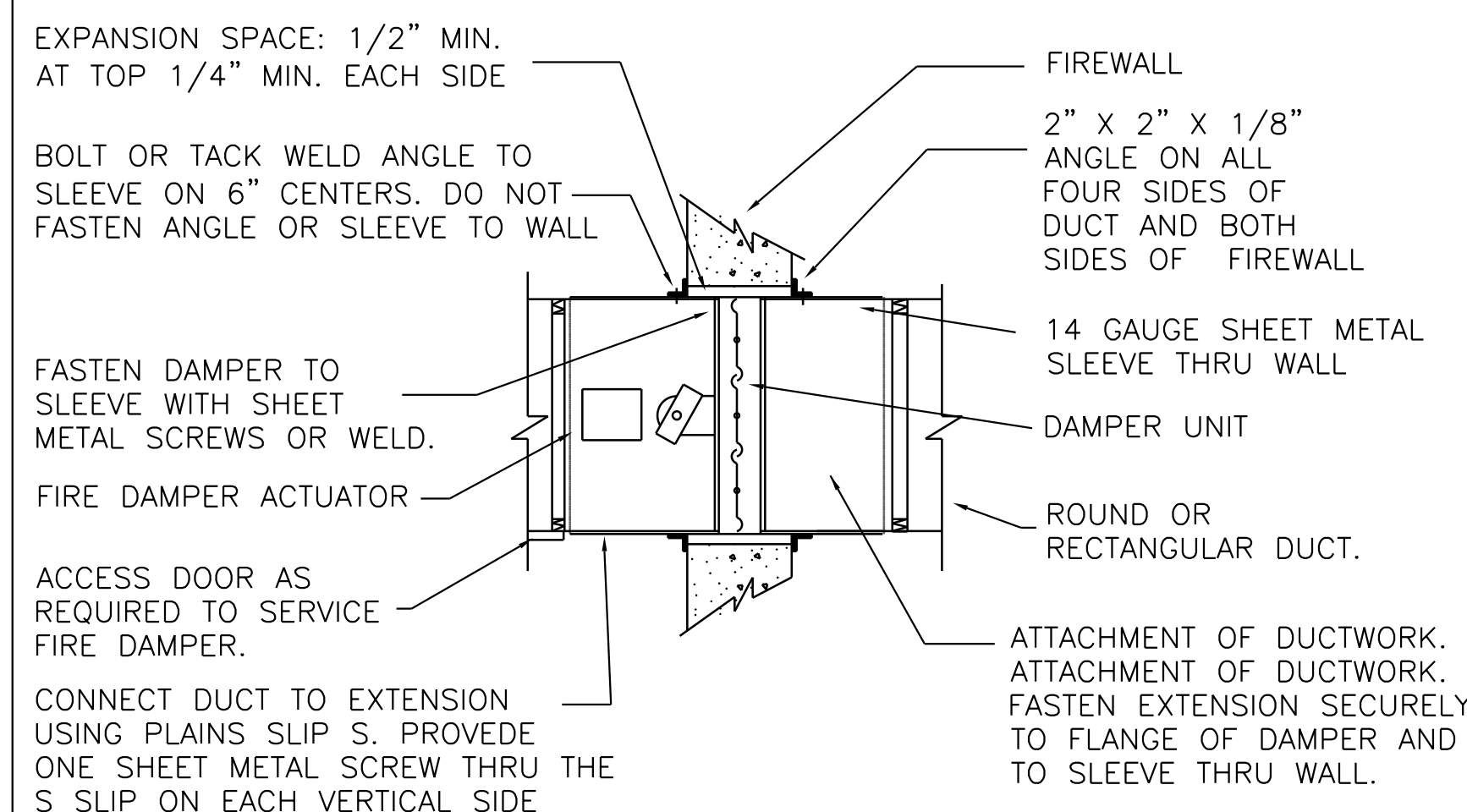
M 5.1.2 NOT TO SCALE



NOTE: CONTRACTOR SHALL SIZE PIPING AND EXPANSION VALVE PER MANUFACTURER'S RECOMMENDATION FOR SCHEDULED CAPACITY UNDER INSTALLED PIPING CONDITIONS.

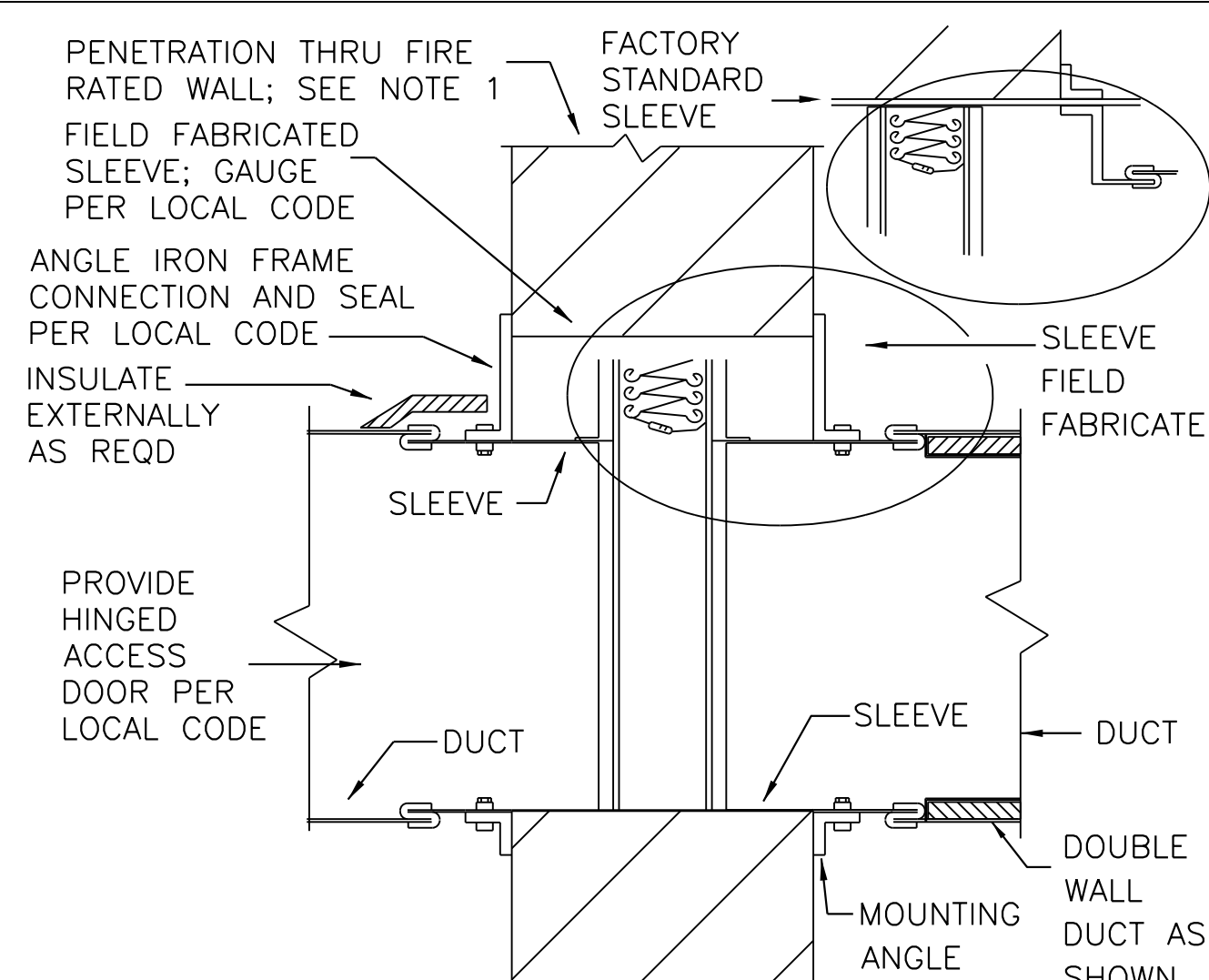
### 9 DX COOLING PIPING DETAIL

M 5.1.2 NOT TO SCALE



### 8 FIRE/SMOKE DAMPER-VERTICAL MOUNT

M 5.1.2 NOT TO SCALE



- NOTES:
1. MAKE OPENING  $\frac{1}{8}$ " PER FOOT LARGER THAN DAMPER DIMENSIONS WITH  $\frac{1}{8}$ " MIN REQD.
  2. SLEEVE GAUGE > GAUGE OF DUCT WHERE DUCT CONSTRUCTION AND JOINTS PER NFPA 90.
  3. DAMPER CONSTRUCTED AND TESTED PER UL 555, UL LABELED, 1-1/2 HOUR FIRE RATING W/212 F FUSIBLE LINK.

### 12 CURTAIN TYPE FIRE DAMPER

M 5.1.2 NOT TO SCALE



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FAX: 770.321.3935

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APPROVED BY:

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AIR CARGO BUILDING C, 100% CONSTRUCTION DOCUMENTS ISSUED FOR BID, NOVEMBER 25, 2014

PACKAGED ROOF TOP UNITS (RMU)				RELATED SECTION 237314			
REFERENCE	RMU-CC-01	RMU-CC-02	RMU-CC-03				
LOCATION	ROOF	ROOF	ROOF				
AREA SERVED	ENTRANCE	SOUTH MEZZ.	NORTH MEZZ.				
DRAWING NUMBER	M 1.3.1	M 1.3.1	M 1.3.1				
AHU TYPE	VARIABLE VOLUME	VARIABLE VOLUME	VARIABLE VOLUME				
MAXIMUM OUTSIDE AIR (CFM)	1,300	1,350	1,150				
MINIMUM OUTSIDE AIR (CFM)	1,200	500	500				
FAN SERVICE	SUPPLY	SUPPLY	SUPPLY				
FAN TYPE							
MAX. AIR FLOW RATE (CFM)	7,900	7,500	6,500				
MIN. AIR FLOW RATE (CFM)	3,940	3,750	3,250				
TOTAL STATIC PRESS(IN WG.)	3.2	3.2	3.2				
EXT STAT PRES (IN WG.)	2.0	2.0	2.0				
FAN RPM/DIA (IN)	1237/-	1221/-	1183/-				
MOTOR RATING (HP)	10	10	10				
COOLING COIL	REFRIGERANT	REFRIGERANT	REFRIGERANT				
TOTAL COOLING (MBH)	273	269	262				
SENSIBLE CAP. (MBH)	183	179	166				
ENTERING AIR TEMP (*F)(DB)	77.8	77.2	77.1				
ENTERING AIR TEMP (*F)(WB)	64.6	64.1	64.2				
COIL LEAVING TEMP (*F)(DB)	54.0	53.0	51.2				
COIL LEAVING TEMP (*F)(WB)	53.0	52.0	50.4				
MAX FACE VELOCITY (FPM)	500	500	500				
AIR PRESS. DROP (IN WG.)	0.49	0.53	0.49				
# OF ROWS/FINS PER INCH	6ROWS/12-FPI	6ROWS/12-FPI	6ROWS/12-FPI				
HEATING COIL	N. GAS FURNACE	N. GAS FURNACE	N. GAS FURNACE				
SERVICE	PREHEAT	PREHEAT	PREHEAT				
INPUT (MBT UH)	500	500	500				
OUTPUT (MBT UH)	410	410	410				
AIR FLOW RATE (CFM)	3,950	3,750	3,250				
AIR TEMP ENTER (*F)(DB)	48.9	47.1	47.5				
AIR TEMP LEAVE (*F)(DB)	55.0	55.0	55.0				
HEATING STAGES	MODULATING	MODULATING	MODULATING				
AIR PRESS. DROP (IN WG.)	0.14	0.14	0.14				
SA FAN SOUND POWER	Supply Return/OA	Supply Return/OA	Supply Return/OA				
63 Hz	90 db	80 db	89 db	80 db	89 db	79 db	
125 Hz	88 db	81 db	87 db	80 db	87 db	80 db	
250 Hz	82 db	75 db	82 db	74 db	81 db	74 db	
500 Hz	80 db	71 db	80 db	71 db	79 db	70 db	
1000 Hz	80 db	71 db	80 db	71 db	79 db	70 db	
2000 Hz	76 db	69 db	75 db	68 db	74 db	68 db	
4000 Hz	73 db	61 db	73 db	61 db	72 db	60 db	
8000 Hz	69 db	58 db	69 db	58 db	68 db	57 db	
AIR COOLED CONDENSER							
CONDENSER FAN, (#HP)	2/1	2/1	2/1				
# OF CIRCUITS	2	2	2				
# OF COMP. PER CIRCUIT	2	2	2				
ENTERING AIR TEMP (*F)	95	95	95				
ELEC SUPPLY (AT 60 HERTZ)	460V/3 PH	460V/3 PH	460V/3 PH				
LOCK ROTOR AMPS (EACH)	19	19					
REFRIGERANT	R-410A	R-410A	R-410A				
MINIMUM EER @ AHRI	11	11	11				
MINIMUM IEER @ AHRI	14	14	14				
ECONOMIZER							
AIR FLOW RATE (CFM)	7900	7500	6500				
TYPE	BAROMETRIC RELIEF	BAROMETRIC RELIEF	BAROMETRIC RELIEF				
DAMPER LOCATION	WALL MOUNTED	WALL MOUNTED	WALL MOUNTED				
TEMP. BASED	60	60	60				
BASIS OF DESIGN							
MANUFACTURER	TRANE - INTELLIPAK	TRANE - INTELLIPAK	TRANE - INTELLIPAK				
MODEL	SFHLF20	SFHLF20	SFHLF20				
MAX. OPERATING WEIGHT (LB)	5,500	5,500	5,500				
ELECTRICAL							
MCA (AMP)	65.47	65.47	65.47				
MFS (AMP)	80	80	80				
POWER SUPPLY (VHZ/PH)	460/60/3	460/60/3	460/60/3				
SINGLE POINT CONNECTION	YES	YES	YES				
DIMENSIONS							
UNIT HEIGHT (FT)	7.25 ft.	7.25 ft.	7.25 ft.				
UNIT LENGTH (FT)	24.13 ft.	24.13 ft.	24.13 ft.				
UNIT WIDTH (FT)	7.83 ft.	7.83 ft.	7.83 ft.				
NOTES	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4				
NOTES:							
1.	PROVIDE WITH 4" MERV-13 FILTERS.						
2.	PROVIDE WITH SUPPLY FAN VARIABLE FREQUENCY DRIVE & HOT GAS BYPASS.						
3.	PROVIDE WITH DOUBLE WALL CASING & INSULATED FACTORY ROOF CURB.						
4.	PROVIDE WITH VIBRATION ISOLATORS.						

DIFFUSERS & GRILLES												RELATED SECTION 233713					
REFERENCE	SAD	RAG	EAG	SD	SWG	RWG	EWG										
DESCRIPTION	CEILING DIFFUSER	CEILING GRILLE	CEILING GRILLE	SLOT DIFFUSER	SIDE WALL GRILLE	SIDE WALL GRILLE	SIDE WALL GRILLE										
SERVICE	SUPPLY	RETURN	EXHAUST	SUPPLY	DOUBLE DEFLEC.	HORI. BLADE	HORI. BLADE										
FACE	PLAQUE	EGG CRATE	EGG CRATE	1" WIDE SLOT	3/4" SPACING	3/4" SPACING	3/4" SPACING										
	24X24	1/2"X1/2"X1/2" GRID	1/2"X1/2"X1/2" GRID	1-SLOT													
	FIXED DISCHARGE			48" LONG													
SIZES/AIRFLOW GEN. NOTE 2	INLET MAX.	INLET MAX.	INLET MAX.	INLET MAX.	INLET MAX.	INLET MAX.	INLET MAX.										
	6" DIA	150 CFM	24"X24"	2000 CFM	8"X8"	300 CFM	6" DIA	150 CFM	SEE PLANS	SEE PLANS	SEE PLANS						
	8" DIA	275 CFM					8" DIA	200 CFM									
	10" DIA	350 CFM															
CONSTRUCTION																	
MATERIALS	ALUMINUM	ALUMINUM	ALUMINUM	INSULATED STEEL	ALUMINUM	ALUMINUM	ALUMINUM										
FINISH	PAINTED	PAINTED	PAINTED		PAINTED/	PAINTED/	PAINTED/										
COLOR: FACE	WHITE	WHITE	WHITE		PRIMED	PRIMED	PRIMED										
COLOR: INTERIOR	BLACK	BLACK	NOT APPLICABLE		BLACK	BLACK	BLACK										
ACCESSORIES																	
BORDER	SEE PLANS	VARIES	VARIES	T-BAR SLOT	SURFACE MTD	SURFACE MTD	SURFACE MTD										
MAX. NC	25	25	25	30	25	25	25										
MAX. PRESSURE DROP	0.10" W.C.			0.10" W.C.	0.10" W.C.	0.10" W.C.	0.10" W.C.										
BASIS OF DESIGN																	
MANUFACTURER/MODEL	TITUS/OMINI	TITUS/50F	TITUS/50F	TITUS/TBD10-FB	TITUS/252FS	TITUS/3FL	TITUS/3FL										
NOTES	1			2 & 3	4												
GENERAL NOTES: (APPLIES TO ALL DIFFUSERS AND GRILLES)																	
1.	PROVIDE FRAMES SUITABLE FOR CEILING TYPE. SEE REFLECTED CEILING PLANS FOR CEILING TYPES.																
2.	UNLESS NOTED OTHERWISE ALL CEILING DIFFUSERS ARE 24"X24"																
3.	ALL SUPPLY DIFFUSERS SHALL BE PROVIDED WITH DAMPER AT FLEX CONNECTION TO SUPPLY DUCT.																
NOTES:																	
1.	PROVIDE WITH FACTORY STANDARD INSULATED BACK.																
2.	PROVIDE WITH INSULATED PLENUM (TITUS MPI-37); INLET SIZES PER PLAN.																
3.	PROVIDE ADJUSTABLE PATTERN CONTROLLER.																
4.	VERTICAL BLADES BEHIND CORE FOR HORIZONTAL DEFLECTION.																

AIR-CONDITIONING UNIT (AC)				RELATED SECTION 238126			
REFERENCE	AC-CC-1						
LOCATION	MECHANICAL-123						
AREA SERVED	DOA						
DRAWING NUMBER	M 1.1.1						
UNIT TYPE	CONSTANT VOLUME						
MINIMUM OUTSIDE AIR (CFM)	300						
FAN SERVICE	SUPPLY						
FAN TYPE	CENTRIFUGAL						
AIR FLOW RATE EACH (CFM)	1,650						
TOTAL STATIC PRESS(IN WG.)	-						
EXT STAT PRES (IN WG.)	0.75						
FAN RPM	DIRECT - VARIABLE						
MOTOR RATING (HP)	1						
COOLING COIL							
TOTAL COOLING (MBTUH)	47.4						
SENSIBLE CAPACITY (MBTUH)	41.4						
NUMBER OF ROWS:	4						
# OF REF. CIRCUIT	1						
ENTERING AIR TEMP (*F)(DB)	78.7						
ENTERING AIR TEMP (*F)(WB)	63.7						
LEAVING AIR TEMP (*F)(DB)	55.1						
LEAVING AIR TEMP (*F)(WB)	53.6						
HEATING							
FURNACE (MBH)	100						
AFUE (%)	96.7						
ENTERING AIR TEMP (*F)(DB)	40						
ELECTRICAL, INDOOR UNIT							
ELEC SUPPLY (AT 60 HERTZ)	115 VOLTS/1 PH						
MCA/MFS	15.2/20						
AIR COOLED CONDENSER	CU-CC-01						
SERVICE	AC-CC-1						
CONDENSER FAN (HP)	1/5						
ENTERING AIR TEMP (*F)	95						
ELEC SUPPLY (AT 60 HERTZ)	208 VOLTS/1 PH						
MCA/MFS/COMPRESSOR LRA	28/45/104						
REFRIGERANT	R-410 A						
COMBINED MINIMUM EER@AHRI	13						
COMBINED MINIMUM SEER@AHRI	17.25						
BASIS OF DESIGN							
MANUFACTURER	TRANE						
MODEL, INDOOR UNIT	TUH2C1009V4						
MODEL, OUTDOOR UNIT	4TTR7048A1						
MAX. WT., INDOOR/OUTDOOR	200 LB/275 LB						
DIMENSIONS INDOOR UNIT							
HEIGHT OF UNIT (IN)	42 in.						
WIDTH OF UNIT (IN)	24.5 in.						
DEPTH OF UNIT (IN)	28.5 in.						
NOTES	1, 2, 3, 4, 5						
NOTES:							
1.	VERTICAL UNIT MOUNTED ON A STEEL FRAME.						
2.	CONDENSING FURNACE, 2-STAGE POWER BURNER, 6" FLUE, & DRAIN NEUTRALIZER.						
3.	UNIT SHALL OPERATED W/ MIN. OF 150FT OF LIQUID REFRIGERANT PIPING.						
4.	PROVIDE WITH 4" MERV-13 FILTERS.						
5.	PROVIDE WITH UNITARY CONTROLLER.						

INFRARED HEATERS (IRH)				RELATED SECTION 235523			
REFERENCE	IRH-CC-01 TO 17	IRH-CC-18 TO 23					
LOCATION	WAREHOUSE-101	WAREHOUSE-101					
AREA SERVED	WAREHOUSE-101	WAREHOUSE-101					
DRAWING NUMBER	M 2.1.1	M 2.1.1					
TYPE	STRAIGHT TUBE	U TUBE					
MOUNTING HEIGHT (AFF)	12.5 ft	18 ft					
# OF UNITS	17	6					
HEATING							
CAPACITY (MBH)	65	200					
STAGES	2	2					
INTENSITY	LOW	LOW					
FUEL	N. GAS	N. GAS					
MIN. INLET PRESS. N GAS (IN)	5	5					
FLUE	NON VENTING	NON VENTING					
ELEC SUPPLY (60 HERTZ)	115 VOLTS/1 PH	115 VOLTS/1 PH					
BASIS OF DESIGN							
MANUFACTURER	REVERBERRY	REVERBERRY					
MODEL	HL3-20-10065	HL3-60-200/145					
OPERATING WEIGHT (LBS)	120	265					
NOTES	1, 2, 3	1, 2, 3					



TERMINAL UNITS																Related Section 233600									
REFERENCE	WR-CC-01-1	WR-CC-01-2	VAV-CC-01-03	WR-CC-01-4	VAV-CC-01-05	WR-CC-01-6	WR-CC-01-7	WR-CC-01-8	WR-CC-01-9	WR-CC-01-10	WR-CC-01-11	WR-CC-01-12	WR-CC-01-13												
DRAWING NUMBER	M 1.1.1	M 1.1.1	M 1.1.1	M 1.1.1	M 1.1.1	M 4.2.1	M 4.2.1	M 4.2.1	M 4.2.1	M 4.2.1	M 1.2.1	M 1.2.1	M 1.2.1												
LOCATION	CUST. SERVICE	CUST. SERVICE	CUST. SERVICE	CUST. SERVICE	CUST. SERVICE	CUST. SERVICE	CUST. SERVICE	CUST. SERVICE	MEZZ CORR	MEZZ CORR	MEZZ S. CORR	MEZZ N. CORR	CORR TO DOA												
ROOMS SERVED	1ST FL EXTERIOR	ELECTRICAL RM	DATARM	1ST FL OFFICE	ELEVATOR RM	2ND FL TOILETS	2ND FL OFFICES	2ND FL PERIMETER	MEZZ CORR	MEZZ CORR	MEZZ S. CORR	MEZZ N. CORR	CORR TO DOA												
PRIMARY VALVE DATA																									
MAX PRIMARY AIR (CFM)	1,400	470	400	800	350	300	500	680	690	690	875	750	600												
MIN PRIMARY AIR (CFM)	640	220	190	370	160	140	230	320	320	320	400	350	280												
INLET DIA (IN)	12-IN	8-IN	8-IN	10-IN	8-IN	6-IN	8-IN	10-IN	10-IN	10-IN	10-IN	10-IN	8-IN												
FAN DATA																									
FAN AIR (CFM)	-	-	-	-	-	-	-	-	-	-	-	-	-												
FAN MOTOR RATING (HP)	-	-	-	-	-	-	-	-	-	-	-	-	-												
VOLTAGE/PHASE/HERTZ	-	-	-	-	-	-	-	-	-	-	-	-	-												
HEATING DATA																									
HEATING AIRFLOW (CFM)	640	220	-	370	-	140	230	320	320	320	400	350	280												
COIL CAPACITY (KW)	7.0 KW	3.0 KW	-	5.0 KW	-	2.0 KW	3.0 KW	4.0 KW	4.0 KW	4.0 KW	5.0 KW	4.0 KW	3.0 KW												
LEAVING AIR TEMP (°F)	90.0	90.0	-	90.0	-	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0												
BASIS OF DESIGN																									
MANUFACTURER/MODEL	TRANE VCEF	TRANE VCEF	TRANE VCEF	TRANE VCEF	TRANE VCEF	TRANE VCEF	TRANE VCEF	TRANE VCEF	TRANE VCEF	TRANE VCEF	TRANE VCEF	TRANE VCEF	TRANE VCEF												
Notes	1, 2, 4, 6	1, 2, 3, 5	1, 7	1, 2, 4, 6, 10	1, 7	1, 2, 3, 5	1, 2, 3, 5	1, 2, 3, 5	1, 2, 4, 6	1, 2, 4, 6, 10	1, 2, 3, 5	1, 2, 3, 5	1, 2, 3, 5												

TERMINAL UNITS																Related Section 233600									
REFERENCE	WR-CC-02-1	WR-CC-02-2	WR-CC-02-3	WR-CC-02-4	WR-CC-02-5		WR-CC-03-1	WR-CC-03-2	WR-CC-03-3	WR-CC-03-4	WR-CC-03-5														
DRAWING NUMBER	M 1.2.1	M 1.2.1	FUTURE	FUTURE	M 1.2.1		M 1.2.1	M 1.2.1	FUTURE	FUTURE	M 1.2.1														
LOCATION	NORTH SHELL MEZZ	NORTH SHELL MEZZ	-	-	NORTH SHELL MEZZ		SOUTH SHELL MEZZ	SOUTH SHELL MEZZ	-	-	SOUTH SHELL MEZZ														
ROOMS SERVED	NORTH SHELL MEZZ	NORTH SHELL MEZZ	-	-	NORTH SHELL MEZZ		SOUTH SHELL MEZZ	SOUTH SHELL MEZZ	-	-	SOUTH SHELL MEZZ														
PRIMARY VALVE DATA																									
MAX PRIMARY AIR (CFM)	1,200	1,200	2,400	2,400	900		1,200	1,200	2,400	1,200	900														
MIN PRIMARY AIR (CFM)	680	680	940	940	510		680	680	920	460	510														
INLET DIA (IN)	12-IN	12-IN	16-IN	16-IN	10-IN		12-IN	12-IN	16-IN	12-IN	10-IN														
FAN DATA																									
FAN AIR (CFM)	-	-	-	-	-		-	-	-	-	-														
FAN MOTOR RATING (HP)	-	-	-	-	-		-	-	-	-	-														
VOLTAGE/PHASE/HERTZ	-	-	-	-	-		-	-	-	-	-														
HEATING DATA																									
HEATING AIRFLOW (CFM)	680	680	940	940	510		680	680	920	460	510														
COIL CAPACITY (MBH)	9.0 KW	9.0 KW	12.5 KW	12.5 KW	6.8 KW		9.0 KW	9.0 KW	12.2 KW	6.1 KW	6.8 KW														
COIL CAPACITY (MBH)	6.0 KW	7.5 KW	11.0 KW	11.0 KW	4.0 KW		6.0 KW	7.5 KW	11.0 KW	6.0 KW	4.0 KW														
LEAVING AIR TEMP (°F)	90.0	90.0	90.0	90.0	90.0		90.0	90.0	90.0	90.0	90.0														
WATER FLOW RATE (GPM)																									
RUNOUT DIA (IN)																									
BASIS OF DESIGN	TRANE VCEF	TRANE VCEF	- -	- -	TRANE VCEF		TRANE VCEF	TRANE VCEF	- -	- -	TRANE VCEF														
MANUFACTURER/MODEL	-	-	-	-	-		-	-	-	-	-														
Notes	1, 2, 4, 6, 9	1, 2, 4, 6, 9	8	8	1, 2, 3, 5, 9, 10		1, 2, 4, 6, 9	1, 2, 4, 6, 9	8	8	1, 2, 3, 5, 9, 10														

Notes

1.

1" INSULATED FIBER-FREE CONSTRUCTION, FACTORY MOUNTED DDC CONTROLLER.

2.

PROVIDE WITH 277 VOLT/24 VOLT TRANSFORMER.

3.

PROVIDE WITH 277 VOLT/1PH ELECTRIC HEATER.

4.

PROVIDE WITH 480 VOLT/3PH ELECTRIC HEATER.

5.

PROVIDE WITH 2-STAGE ELECTRIC HEATER.

6.

PROVIDE WITH 3-STAGE ELECTRIC HEATER.

7.

PROVIDE WITH 120 VOLT/24 VOLT TRANSFORMER.

8.

FUTURE TERMINAL UNIT SCHEDULED FOR REFERENCE ONLY.

9.

FOR SHELL SPACE, TERMINAL UNIT MINIMUM IS ADJUSTED TO MAINTAIN MINIMUM AIRFLOW ACROSS COOLING COIL.

10.

PROVIDE WITH CO2 SENSOR, SEE SHEET M 7.1.1.



CITY OF ATLANTA, GEORGIA

Hartsfield-Jackson  
Atlanta International Airport



HERRY INTERNATIONAL, INC. 999  
PEACHTREE STREET, NE  
ATLANTA, GA 30309  
PHONE: 404.418.9190  
FAX: 404.846.2017

MATROX 3D  
44 BROAD STREET  
ATLANTA, GA 30303  
PHONE: 404.522.3801  
FAX: 404.522.3823

STEVENS & WILKINSON, INC.  
100 PEACHTREE STREET NW, SUITE 2500  
ATLANTA, GA 30303  
PHONE: 404.522.0888  
FAX: 404.521.6204

SOUTHEASTERN ENGINEERING, INC. (SEI)  
2401 SANDY PLAINS ROAD  
MARIETTA, GA 30066  
PHONE: 770.321.5038  
FAX: 770.321.3935

AIR CARGO BUILDING C, 100% CONSTRUCTION DOCUMENTS ISSUED FOR BID, NOVEMBER 25, 2014

NOT RELEASED FOR CONSTRUCTION



Building: System Tag/Name: Delete Zone Add Zone Intercontinental Exchange - HQ Renovation AC-CC-01 VAV System IP

Inputs for System: Name Units System Diversity System

Inputs for Potentially Critical Zones: Zone Name Show Values per Zone

Results: System Ventilation Efficiency 0.73

Building: System Tag/Name: Delete Zone Add Zone Intercontinental Exchange - HQ Renovation RMU-CC-01 VAV System - Cooling Season IP

Inputs for System: Name Units System Diversity System

Inputs for Potentially Critical Zones: Zone Name Show Values per Zone

Results: System Ventilation Efficiency 0.72

Building: System Tag/Name: Delete Zone Add Zone Intercontinental Exchange - HQ Renovation RMU-CC-01 VAV System - Cooling Season Minimum IP

Inputs for System: Name Units System Diversity System

Inputs for Potentially Critical Zones: Zone Name Show Values per Zone

Results: System Ventilation Efficiency 0.70

Building: System Tag/Name: Delete Zone Add Zone Intercontinental Exchange - HQ Renovation RMU-CC-01 VAV System - Heating Season IP

Inputs for System: Name Units System Diversity System

Inputs for Potentially Critical Zones: Zone Name Show Values per Zone

Results: System Ventilation Efficiency 0.85

Building: System Tag/Name: Delete Zone Add Zone Intercontinental Exchange - HQ Renovation RMU-CC-02 VAV System - Cooling Season IP

Inputs for System: Name Units System Diversity System

Inputs for Potentially Critical Zones: Zone Name Show Values per Zone

Results: System Ventilation Efficiency 0.63

Building: System Tag/Name: Delete Zone Add Zone Intercontinental Exchange - HQ Renovation RMU-CC-02 VAV System - Cooling Season Minimum IP

Inputs for System: Name Units System Diversity System

Inputs for Potentially Critical Zones: Zone Name Show Values per Zone

Results: System Ventilation Efficiency 0.84

Building: System Tag/Name: Delete Zone Add Zone Intercontinental Exchange - HQ Renovation RMU-CC-02 VAV System - Heating Season IP

Inputs for System: Name Units System Diversity System

Inputs for Potentially Critical Zones: Zone Name Show Values per Zone

Results: System Ventilation Efficiency 0.72

Building: System Tag/Name: Delete Zone Add Zone Intercontinental Exchange - HQ Renovation RMU-CC-03 VAV System - Cooling Season IP

Inputs for System: Name Units System Diversity System

Inputs for Potentially Critical Zones: Zone Name Show Values per Zone

Results: System Ventilation Efficiency 0.63

Building: System Tag/Name: Delete Zone Add Zone Intercontinental Exchange - HQ Renovation RMU-CC-03 VAV System - Cooling Season Minimum IP

Inputs for System: Name Units System Diversity System

Inputs for Potentially Critical Zones: Zone Name Show Values per Zone

Results: System Ventilation Efficiency 0.84

Building: System Tag/Name: Delete Zone Add Zone Intercontinental Exchange - HQ Renovation RMU-CC-03 VAV System - Heating Season IP

Inputs for System: Name Units System Diversity System

Inputs for Potentially Critical Zones: Zone Name Show Values per Zone

Results: System Ventilation Efficiency 0.72



CITY OF ATLANTA, GEORGIA

Hartsfield-Jackson Atlanta International Airport



HERRY INTERNATIONAL, INC. 969 PEACHTREE STREET, NE ATLANTA, GA 30309

MATRIX 3D 44 BROAD STREET ATLANTA, GA 30303

SOUTHEASTERN ENGINEERING, INC. (SEI) 405 SANDY PLAINS ROAD MARIETTA, GA 30066

NOT RELEASED FOR CONSTRUCTION

NO. DATE BY REVISION

AIR CARGO BUILDING C

MECHANICAL LEED VENTILATION CALCULATIONS

WBS NUMBER: D.07.55.009

DRAWN BY: K. MILNER

FC NUMBER: FC-0006007929-A

DESIGNED BY: R. ANWAR

AE PROJECT NUMBER: HI-0730621

CHECKED BY: D. POPE

APPROVED BY: R. ANWAR

DATE: 11/25/2014

SCALE: AS NOTED

SHEET NO. M 6.1.3





CITY OF ATLANTA, GEORGIA

Hartsfield-Jackson  
Atlanta International Airport



HEERY INTERNATIONAL, INC. 959  
PEACHTREE STREET, NE  
ATLANTA, GA 30309  
PHONE: 404.416.5190  
FAX: 404.546.2017

MATROX 3D  
44 BROAD STREET  
ATLANTA, GA 30303  
PHONE: 404.522.3801  
FAX: 404.522.3823

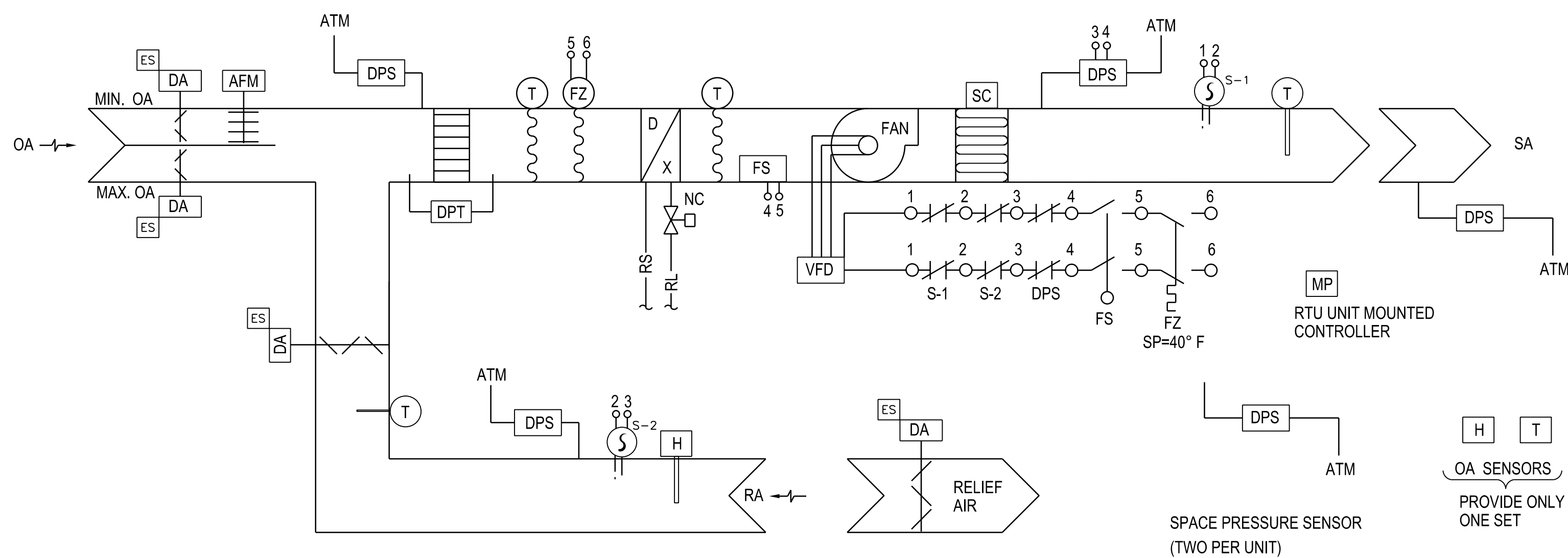
STEVENS & WILKINSON, INC.  
100 PEACHTREE STREET NW, SUITE 2500  
ATLANTA, GA 30303  
PHONE: 404.522.0888  
FAX: 404.521.6204

SOUTHEASTERN ENGINEERING, INC. (SEI)  
2015 SANDY PLAINS ROAD  
MARIETTA, GA 30066  
PHONE: 770.321.5038  
FAX: 770.321.3935

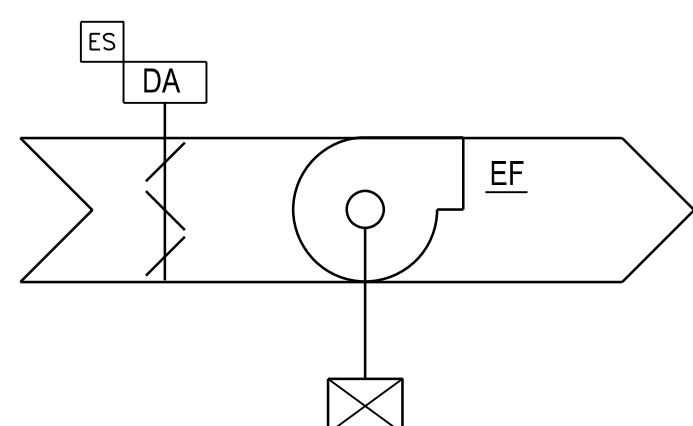
AIR CARGO BUILDING C, 100% CONSTRUCTION DOCUMENTS ISSUED FOR BID, NOVEMBER 25, 2014

NOT RELEASED FOR CONSTRUCTION

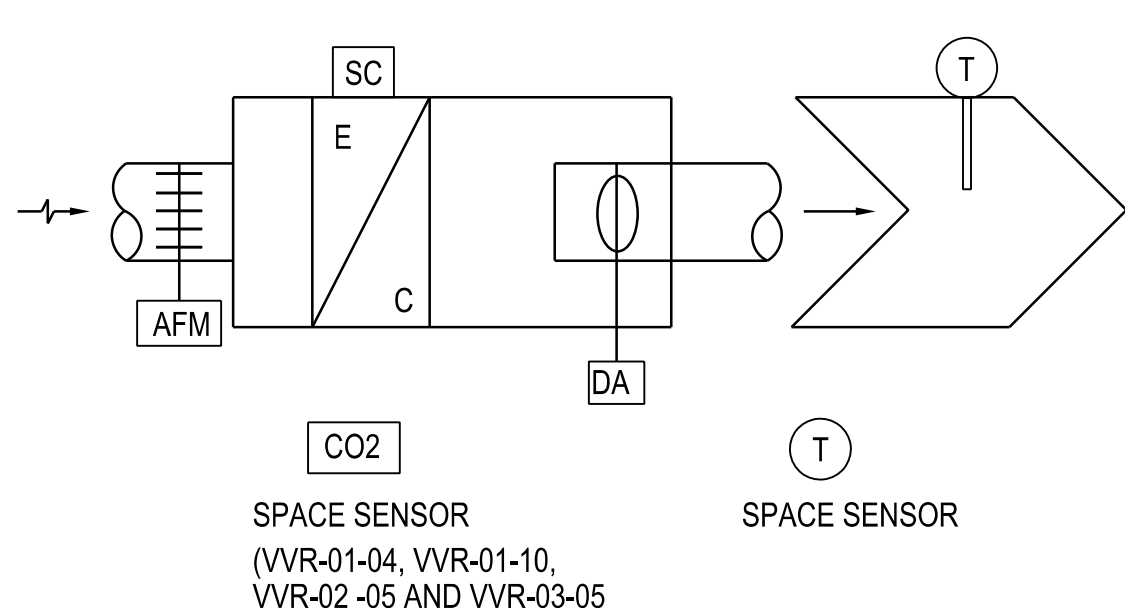
AO	AI	DO	DESCRIPTION	NOTES
1 - RTU-CC-01, 02, AND 03				
X			DAMPER MODULATION MIN. OA	NORMALLY OPENED
	X		DAMPER END SWITCH	OUTSIDE AIR DAMPER CLOSE STATUS
		X	AIRFLOW STATION	MIN OA MONITOR & CONTROL
X			DAMPER MODULATION MAX. OA	NORMALLY CLOSED
	X		DAMPER END SWITCH	OUTSIDE AIR DAMPER CLOSE STATUS
	X		DIFFERENTIAL PRESS. SENSOR	MIXING BOX PRESSURE
X			DIFFERENTIAL PRESS. TRANSDUCER	FILTER MONITOR
X			AVERAGE TEMP. SENSOR	MIXED AIR TEMP
	X		FREEZE STAT	SET POINT AT 40 DEG.
X			SOLENOID VALVE MODULATION	DX
	X		AVERAGE TEMP. SENSOR	DX COIL LEAVING AIR TEMPERATURE
	X		FLOAT SWITCH	CONDENSATE DRAIN PAN OVERFLOW
	X		VFD START-STOP	SUPPLY FAN
		X	VFD AUXILIARY CONTACTS	FAN STATUS
X			VFD SPEED MODULATION	SUPPLY FAN
X			FURNACE STEP CONTROLLER	NATURAL GAS FURNACE
	X		DIFFERENTIAL PRESS. SWITCH	SA DUCT HIGH LIMIT
	X		SMOKE DETECTOR	SA DUCT
X			TEMP. SENSOR	UNIT LEAVING AIR TEMPERATURE
X			DIFFERENTIAL PRESS. SENSOR	SA DUCT PRESS. VFD SPEED CONTROL
	X		RTU START STOP	PROGRAM START/STOP
X			HUMIDITY SENSOR	OUTDOOR; ONE PER DDC SYSTEM
X			TEMP. SENSOR	OUTDOOR; ONE PER DDC SYSTEM
X			GLOBAL DIFF. PRESS. SENSOR	SPACE STATIC PRESSURE
X			HUMIDITY SENSOR	RA HUMIDITY MONITORING
	X		SMOKE DETECTOR	RETURN AIR DUCT
	X		DIFFERENTIAL PRESS. SWITCH	RA DUCT LOW LIMIT
	X		TEMP. SENSOR	RA TEMPERATURE
X			DAMPER MODULATION	RETURN AIR DAMPER CONTROL
	X		DAMPER END SWITCH	RETURN AIR DAMPER CLOSE STATUS
X			DAMPER MODULATION	RELIEF AIR DAMPER CONTROL
	X		DAMPER END SWITCH	RELIEF AIR DAMPER CLOSE STATUS
	X		INTERLOCK RELAY	FROM FIRE ALARM SYSTEM
2 - VAV-CC-XX				
	X		AIRFLOW STATION	MIN OA MONITOR & CONTROL
X			DAMPER MODULATION	NORMALLY CLOSED
	X		TEMP. SENSOR	SA DUCT
	X		TEMP. SENSOR	SPACE
3 - VVR-CC-XX				
	X		AIRFLOW STATION	MIN OA MONITOR & CONTROL
X			STEP CONTROLLER	ELECTRICAL DUCT HEATER
X			DAMPER MODULATION	NORMALLY CLOSED
	X		TEMP. SENSOR	SA DUCT
	X		TEMP. SENSOR	SPACE
	X		CO2 SENSOR	SPACE; AS SHOWN ON PLANS
4 - REF-CC-01				
		X	ISOLATION DAMPER	TWO POSITION
		X	DAMPER END SWITCH	RELIEF AIR DAMPER CLOSE STATUS
		X	START-STOP	EXHAUST FAN
5 - HVU-CC-01 & 02				
		X	SMOKE DETECTOR	RA DUCT
	X		DIFFERENTIAL PRESS. TRANSDUCER	FILTER MONITOR
		X	VFD START-STOP	SUPPLY FAN
		X	VFD AUXILIARY CONTACTS	FAN STATUS
X			VFD SPEED MODULATION	SUPPLY FAN
X			FURNACE STEP CONTROLLER	NATURAL GAS FURNACE
	X		TEMP. SENSOR	UNIT LEAVING AIR TEMPERATURE
	X		DIFFERENTIAL PRESS. SENSOR	SA DUCT PRESS. VFD SPEED CONTROL
	X		SMOKE DETECTOR	SA DUCT
	X		TEMP. SENSOR	SA DUCT
	X		TEMP. SENSOR	SPACE
	X		INTERLOCK RELAY	FROM FIRE ALARM SYSTEM
6 - REF-CC-03 & 09				
		X	ISOLATION DAMPER	TWO POSITION
		X	DAMPER END SWITCH	RELIEF AIR DAMPER CLOSE STATUS
		X	VFD START-STOP	EXHAUST FAN
		X	VFD AUXILIARY CONTACTS	FAN STATUS
X			VFD SPEED MODULATION	EXHAUST FAN
	X		TEMP. SENSOR	SPACE TEMP. VFD SPEED CONTROL
7 - REF-CC-02, 04-08, 10 & 11				
		X	ISOLATION DAMPER	TWO POSITION
		X	DAMPER END SWITCH	RELIEF AIR DAMPER CLOSE STATUS
		X	START-STOP	EXHAUST FAN
	X		CURRENT SENSOR	EXHAUST FAN
	X		TEMP. SENSOR	SPACE TEMP.
8 - IRH-CC-01-17				
		X	DOOR OPENED/CLOSED STATUS	
	X		START-STOP	INFRARED HEATER
	X		TEMP. SENSOR	SPACE TEMP.
9 - EF-CC-01				
		X	ISOLATION DAMPER	TWO POSITION
		X	DAMPER END SWITCH	RELIEF AIR DAMPER CLOSE STATUS
		X	START-STOP	EXHAUST FAN
10 - AC-CC-01/CU-CC-01				
X			DAMPER MODULATION MIN. OA	NORMALLY OPENED
		X	DAMPER END SWITCH	OUTSIDE AIR DAMPER CLOSE STATUS
X			DAMPER MODULATION MAX. OA	NORMALLY CLOSED
		X	DAMPER END SWITCH	OUTSIDE AIR DAMPER CLOSE STATUS
X			DAMPER MODULATION	RETURN AIR DAMPER CONTROL
	X		DAMPER END SWITCH	RETURN AIR DAMPER CLOSE STATUS
	X		TEMP. SENSOR	MIXED AIR TEMPERATURE
	X		FLOAT SWITCH	CONDENSATE DRAIN PAN OVERFLOW
	X		TEMP. SENSOR	UNIT LEAVING AIR TEMPERATURE
	X		AC START STOP	PROGRAM START/STOP
	X		TEMP. SENSOR	SPACE TEMP.
	X		GLOBAL DIFF. PRESS. SENSOR	SPACE STATIC PRESSURE
	X		CO2 SENSOR	SPACE; AS SHOWN ON PLANS
X			DAMPER MODULATION	RELIEF AIR DAMPER CONTROL
		X	DAMPER END SWITCH	RELIEF AIR DAMPER CLOSE STATUS



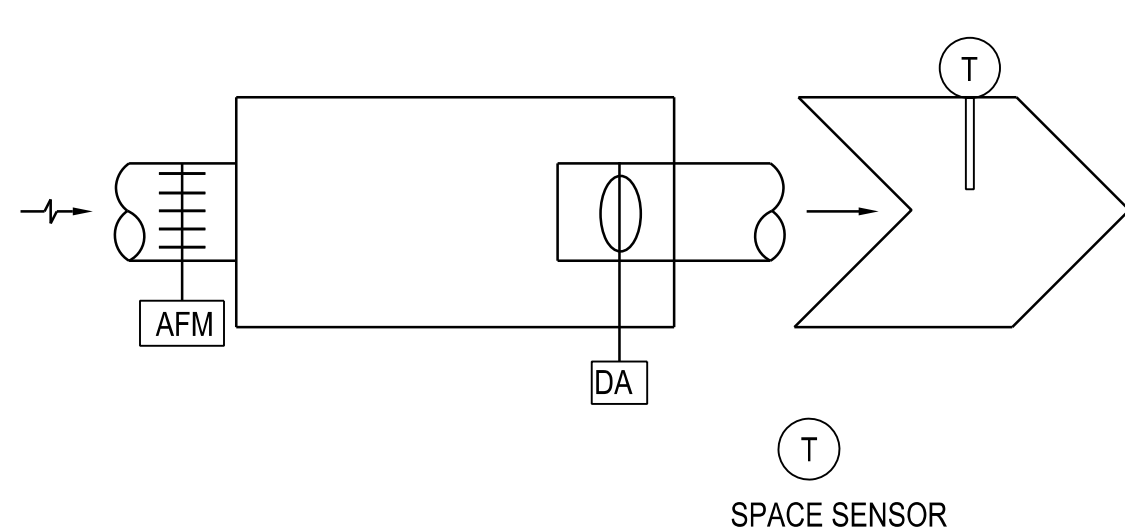
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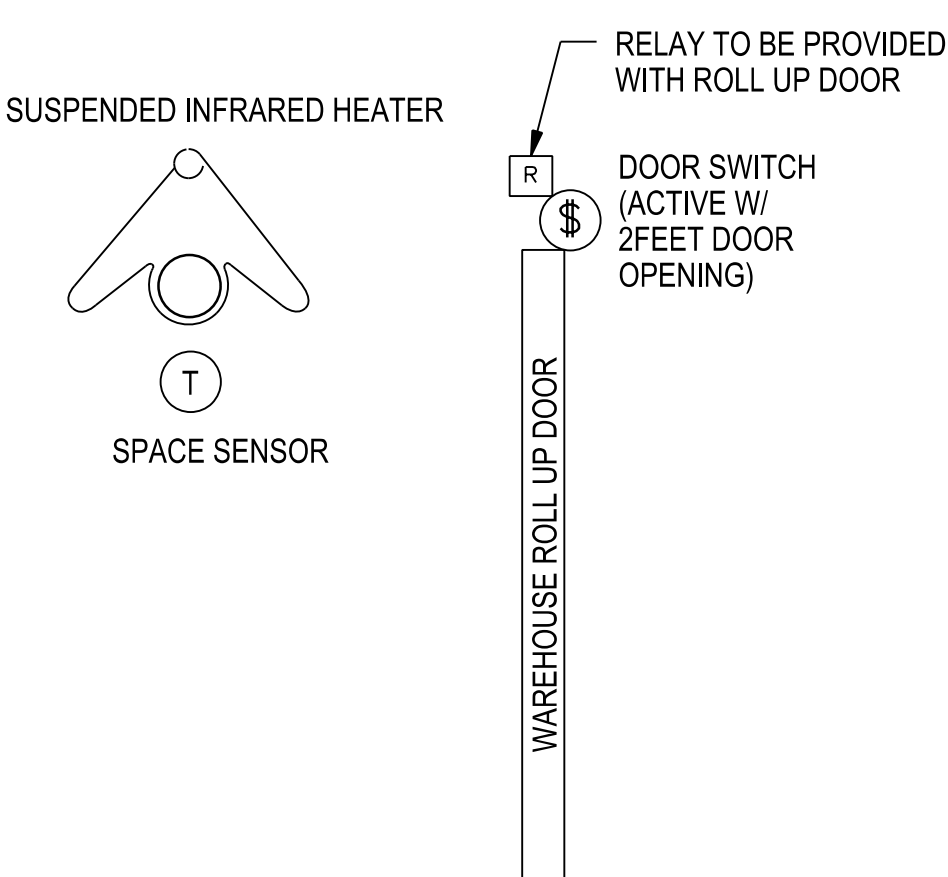
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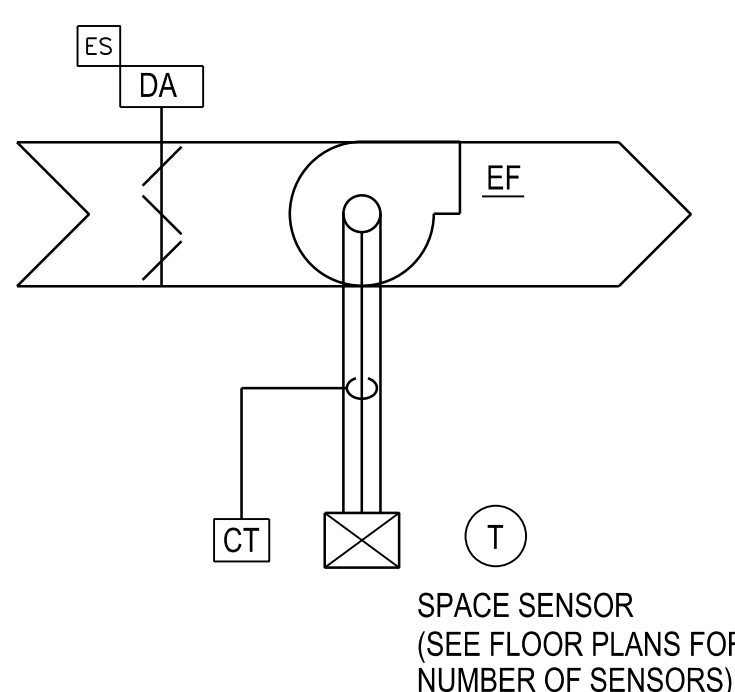
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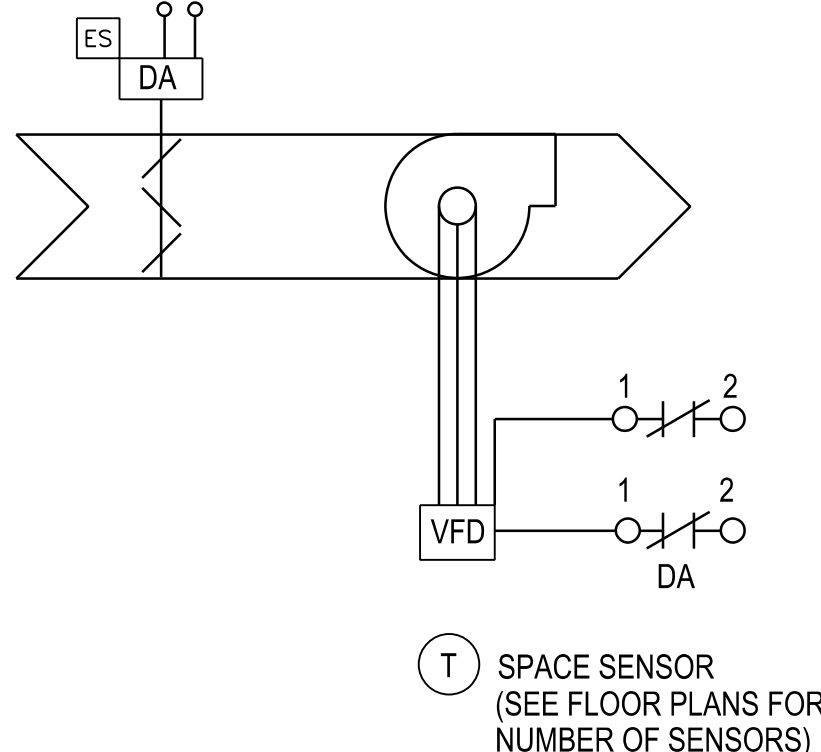
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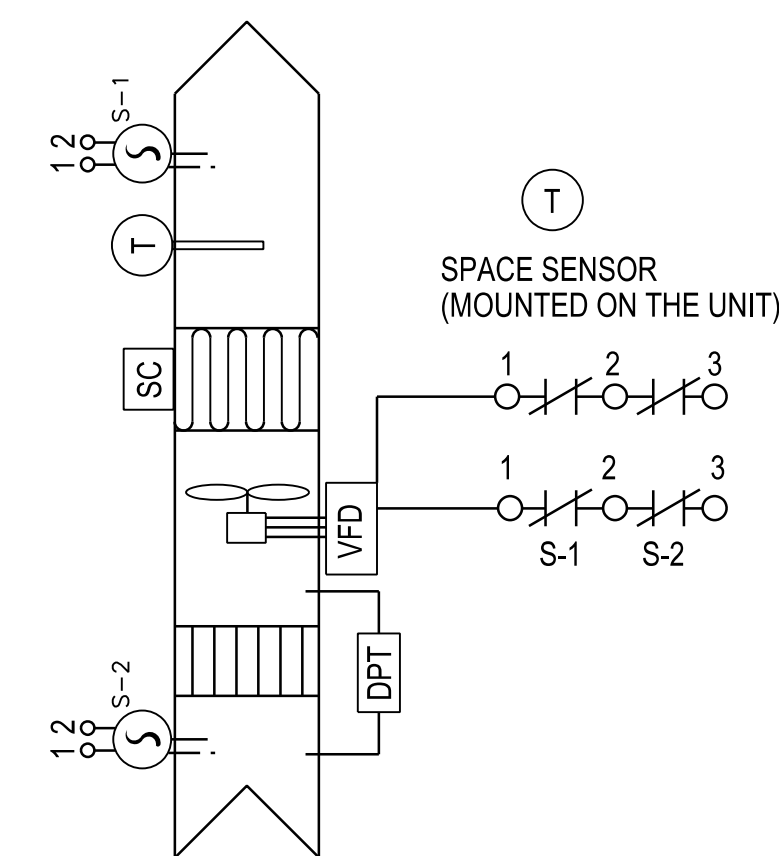
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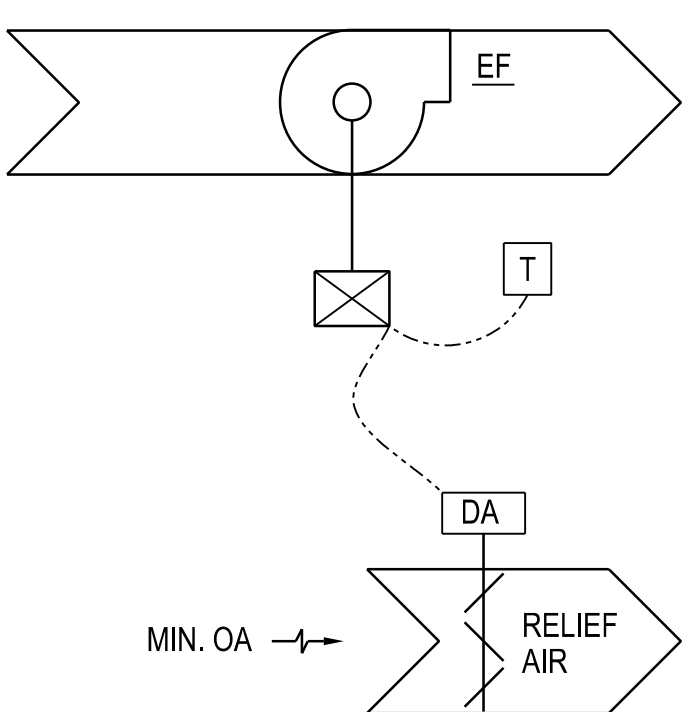
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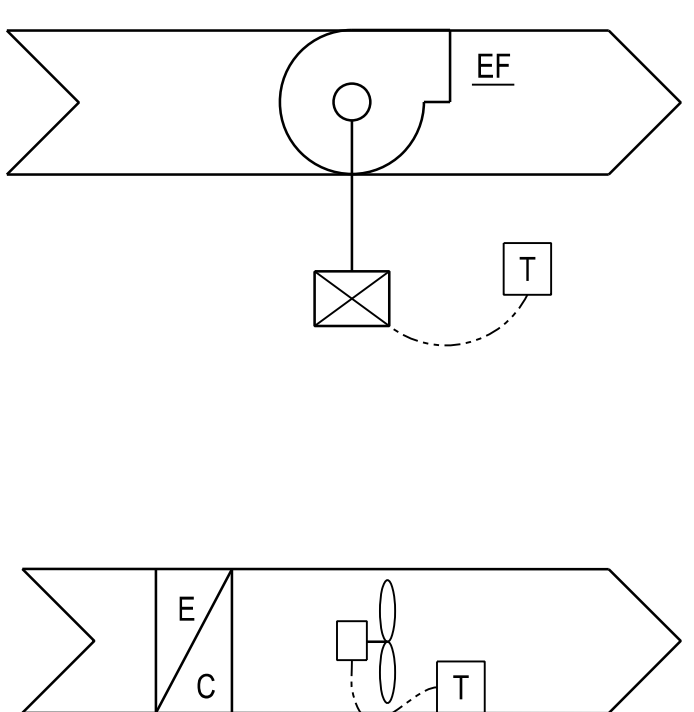
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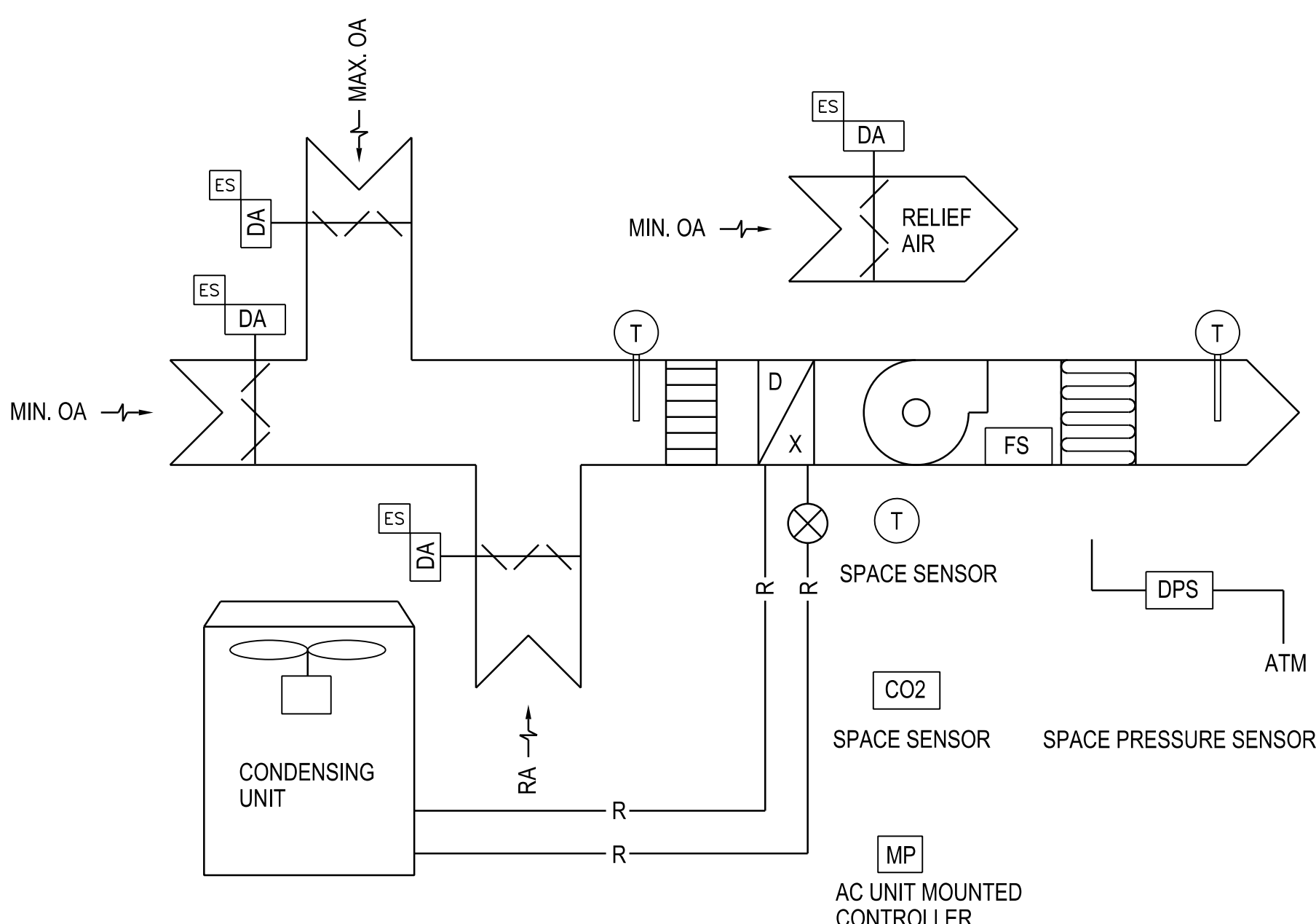
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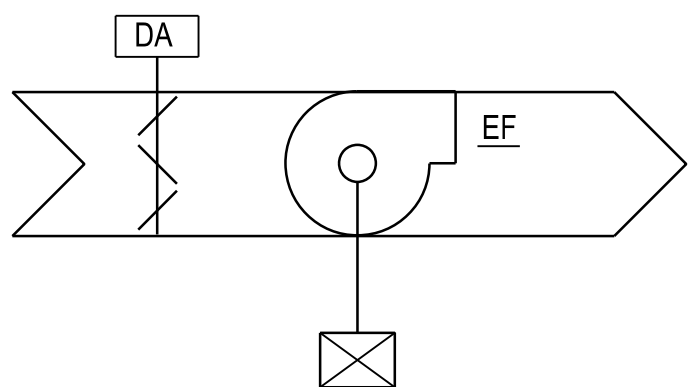
12 EF-CC-02  
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11 EF-CC-03 & EWH-CC-01  
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10 AC-CC-01/CU-CC-01  
SCALE: NONE



9 EF-CC-01  
SCALE: NONE

NO. DATE BY REVISION

AIR CARGO BUILDING C

MECHANICAL  
CONTROLS AND  
POINTS LIST

WBS NUMBER:  
D.07.55.009  
FC NUMBER:  
FC-6006007929-A  
A/E PROJECT NUMBER:  
HIL-0730621

DRAWN BY:  
K. MILNER  
DESIGNED BY:  
R. ANWAR  
CHECKED BY:  
D. POPE  
APPROVED BY:  
R. ANWAR

DATE:  
11/25/2014

SCALE:  
AS NOTED

SHEET NO.:

M 7.1.1

SEAL



1.1 GENERAL SEQUENCE OF OPERATION REQUIREMENTS

A. The following apply to all control sequences.

1. Microprocessor based controls:

- All control functions shall be microprocessor based BACnet compatible DDC unless otherwise specified.
- All start/stop schedules shall be through the DDC SYSTEM. Separate electric, electronic or electromechanical time clocks are not acceptable unless specified otherwise.
- Provide control graphics on multi paged touch screen interface panel operator workstation (OWS).

2. Rotational point program:

- For Heating System provide the option for the DDC SYSTEM operator to specify changeover based on calendar time (hours, day, week or month) or based on actual run time.
- Actual run time shall be recorded based on current sensing relay.

3. Fans and Pump Motors with HOA:

- With HOA switch located on the motor starter in "hand" or "on" position, motor shall operate.
- In "off" position, motor shall stop.
- In "auto" position, motor operation shall be controlled through the DDC SYSTEM.
- Operation in "hand" or "on" position shall be subject to safeties in associated systems and shall not override safeties intended to protect the associated system or system components.

4. Fans Motors with HOA and Variable Frequency Drive (VFD).  
With HOA switch located on the motor starter in "hand" or "on" position, motor shall operate at the speed manually selected at the drive.

- In "off" position, motor shall stop.
- In "auto" position, motor operation and speed shall be controlled through the DDC SYSTEM.
- Operation in "hand" or "on" position shall be subject to safeties in associated systems and shall not override safeties intended to protect the associated system or system components.

5. For each piece of equipment with a variable speed controller, provide binary input to monitor drive HOA switch position to provide "Under Manual Control" indication.
6. Start time optimization:

- Provide heating optimal morning start-up for each RMU's Optimal Start shall include Heating System start-up needs.

7. Fixed time:

- Provide individual start/stop time where specified in the Sequence of Operation including each of the following:

- 1) Packaged Air Conditioning Units (PAC),
- 2) Terminal Units (VYRYAV),
- 3) Heating & Ventilation Units (HVVU),
- 4) Infrared Heating Systems (IRH),
- 5) Electric Wall Heater (EWH),
- 6) Exhaust Fans (EF/REF).

8. Load cycling: Provide the capability to cycle any piece of equipment. Equipment, priority and on/off duration shall be able to be assigned by the DDC SYSTEM operator.
9. Load shedding: Provide the capability to "shed" any piece of equipment. Equipment, priority and shed limits shall be able to be assigned by the DDC SYSTEM operator.

10. Alarms:

- All analog inputs shall have high and low alarm points programmed to print-out at OWS.
- Critical points shall be programmed to printout alarm conditions at OWS.
- If any piece of HVAC equipment is abnormally stopped, it shall be treated as a critical alarm.
- DDC SYSTEM operator shall have capability to assign alarm classification to any point.
- Alarm the user interface, turn off the lead equipment and start lag equipment upon detection of motor current at plus or minus 10% (adjustable) of full load current for 2 minutes or longer (adjustable). Full load current shall be as determined during test and balance.
- Alarm user interface if any equipment with HOA switch is operating in manual override as determined by equipment operation outside the control of the DDC system. The alarm shall totalize the minutes of manual override operation.
- Alarm the user interface if the fluid temperature is not at setpoint for 15 minutes or longer.
- A mismatch alarm shall be indicated whenever a mismatch condition exists between any associated DDC SYSTEM command and DDC SYSTEM status points. Mismatch shall be treated as a general alarm.

11. Historical data: All alarms shall be recorded in Historical Data.
12. Trend logs: Initially provide trend logs for all binary points (indicates each change of state, each on or off) and provide trend logs for all analog points. This data will be used for commissioning of the building.

13. Run time totalization program: Initially enable all of the equipment associated with the following systems in the run-time totalization program:
- a. Warehouse Heating & Ventilation system,
  - b. RMUs,
  - c. Split Air Conditioning System
  - d. Exhaust fans
- c. Each run-time totalization point shall have run-time limits operator assignable programmed to trip maintenance required program messages when motor run time reaches the run time limit.

14. Setpoints:

- All setpoints shall be user adjustable from central DDC SYSTEM Room, from graphic that displays values and from the local control panel.
- Reference the Equipment Schedules for setpoints to be used in setting up the DDC SYSTEM system.
- Confirm final setpoints, such as room or space temperature, leaving air temperatures, with owners.
- Set all Terminal Units to 75 deg F. Set unoccupied setback and set-up to +/- 9 deg F.
- Set Occupant override duration to 3 hours.
- Occupant override shall be set to +/- 2 deg F Initially, disable the occupant override until building has been fully commissioned and the system capacity and controls operation has been demonstrated.
- Provide master schedule for Terminal Units setpoints, including room setpoint, occupant override range, occupant override duration and night setback/setup on a master schedule so that the settings for all Terminal Units can be reset from one schedule.
- Warehouse heating setpoint shall be 50°F during heating season, whereas space exhaust fans ventilate the warehouse during cooling season.

15. Sensors:

- Provide averaging type sensors for all the mixed air section temperature sensors specified in RMUs. Other sensors, where the temperature is nearly uniform, shall be single point type.

16. Dampers:

- All outdoor air dampers shall be fail safe type that fail closed unless specified otherwise.
- Provide modulating control action for all damper actuators
- Provide separate analog output for minimum outside air damper, maximum outside air dampers and return dampers air dampers.

17. Coordination:

- Coordinate analog point requirement of 0-10 V dc or 4-20 mA with equipment.
- Coordinate voltage requirements of all control equipment, especially those furnished with equipment or by other sections such as variable speed motor controllers.

18. Start/stop schedules: Confirm all start/stop schedules with Owner before final software set-up.
19. Control action: All modulating control action shall be proportional + integral + derivative unless specified otherwise.
20. Equipment and sensor identification: Develop a system of names or acronyms for use in identifying equipment, sensors, etc. that will allow easy DDC SYSTEM reference.
21. Time delays: With all control functions, provide the necessary time delays in software to allow equipment, equipment controls or systems to respond to DDC SYSTEM commands.

1.2 ROOF MOUNTED PACKAGED AIR CONDITIONING UNIT (RMU-CC-01 TO 013):

A. Off and Normal Positions:

1. Fans shall be off, supply fan speed controllers signal shall be zero.
2. Normally open return air damper shall be closed.
3. Normally closed outside air dampers shall be closed.
4. Normally turned off supply fan shall stay off unless mixed air temperature drops below 40 deg F, at which time it turn on at low heat to prevent the temperature from dropping further.

B. Fan control safeties shall include:

1. Smoke detectors mounted in the supply and return ducts.
2. Manually reset discharge air static pressure high limit switch.
3. Manually reset float switch.
4. Manually reset gas furnace leaving air temperature freeze/reat.
5. Manually reset return air static pressure low limit switch.
6. All shut safeties shall be hardwired to the fan motor starters and individually monitored by the DDC SYSTEM.

C. Start/Stop:

1. The HOA switch for the supply is located on the variable speed drives.
2. When the supply fan HOA switch is in the hand position, the return damper shall open and the fan shall operate at the automatically controlled speed subject to other specified safety interlocks.
3. When the supply fan HOA switch is in the "off" position, the fan shall stop and all controlled devices shall return to their normal position.
4. When the supply fan HOA switch is in the "auto" position, the supply fan shall be started from the optimum timed program command of the DDC SYSTEM or as manually commanded at the OWS, subject to specified safety interlocks.

D. Occupied-Unoccupied Mode Control:

1. In the occupied mode, RMU shall run continuously and the return damper shall modulate to maintain the outside air flow setpoint.
2. In the unoccupied mode, RMU shall run continuously and the return damper shall modulate to maintain the low occupancy outside air flow setpoint.
3. Outside air on RMU shall modulate to open to maintain space CO2 setpoint as required.
4. During scheduled unoccupied periods, the supply fan shall be started by zone temperature sensors anytime the space temperature drops below 60 degrees F and anytime the space temperature rises above 85 degrees F.
5. Further, during scheduled unoccupied periods the supply fan shall be started by a two-hour timed override switch mounted on the space temperature sensor, see floor plan.

E. Manual Start/Stop Program: Provide capability for OWS operator to override an optimized start or stop times for an OWS operator specified period of time. Manual override shall not override any of the safety interlocks including freeze protection, fire alarm, high and low dust static pressure.

F. Economizer control (maximum outside air damper):

1. Whenever the outside air enthalpy is below the return air enthalpy the economizer switchover the unit to operate under the economizer mode.
2. During the economizer mode, the minimum OA controller's occupancy schedule control shall be disabled and the minimum OA controller shall be set for building minimum OA setpoint.
3. The economizer outside air damper shall modulate open on a call for cooling from the discharge temperature control signal.
4. If the economizer air damper reaches maximum open and cannot maintain the discharge air temperature at setpoint, fan speed shall modulate up from minimum up to 100%. If space temperature still exceeds 74°F, fan speed shall reset to minimum and the mechanical cooling shall sequence to maintain the maximum outside air damper to closed position on a fall in mixed air temperature below setpoint of 45 deg. F (adjustable).
5. Likewise, whenever the supply air temperature drops below the setpoint for 10 minutes (adjustable), the control system shall modulate the maximum OA damper and return air damper in sequence to maintain the supply air temperature at setpoint.
6. The control system shall modulate the return air damper and wall mounted relief air damper in sequence to maintain the plenum pressure and the space pressure at set points; the setpoint pressures shall be determined at test and balance.
7. A mixed air low limit program will modulate the maximum outside air damper to closed position on a fall in mixed air temperature below setpoint of 45 deg. F (adjustable).
8. When not in economizer mode, the maximum outside air damper will be closed and the mechanical cooling will maintain the discharge temperature at setpoint.
9. Whenever the return air humidity rises above 65% (adjustable) the economizer mode will be deactivated.
10. The economizer damper shall be interlocked via hard wired connection with the freeze/reat to cut the power off for the spring return actuated damper in case temperature falls below 40°F (adjustable).

G. Fan and Filter Status:

1. Provide a current sensing at supply fan to indicate fan status.
2. Provide differential pressure switch at each filter bank to indicate filter status.

H. Fan Speed:

1. The supply fan is variable speed. The variable speed drive is specified elsewhere as a variable frequency drive.
2. The speed controllers shall accept a control signal input of 4-20mA or 0-10 V dc for modulation control (coordinate with specified manufacturers.)
3. Fan speed (indicated in the form of digital RPM indicators located on the variable speed drive panel) shall be monitored by the OWS.
4. With switch in the Hand position the fan shall operate at the automatically selected speed.
5. Duct high and low static pressure control shall not be overridden.
6. With the switch in the Auto position, the controls shall operate as described in the following paragraphs.
7. Duct static pressure sensor shall modulate supply fan variable speed drive to maintain supply duct static pressure.
8. The supply fan speed shall be under PID control. Upon start-up the PID setpoint shall be slowly ramped up at a rate to provide fan loading of 0-100 percent over a sixty second (adjustable) period.
9. Fan energy shall be minimized through static pressure setpoint adjustment. If all boxes are less than fully open, reset duct static pressure down in increments of 0.05" W.C. every ten minutes until any terminal unit damper is in the full open position.

I. Variable Speed Motor Controller Monitoring: For each piece of equipment with variable speed controller monitor VFD operations through the DDC SYSTEM.

J. Supply Air Temperature:

1. Anytime the supply fan runs and the return air temperature is 7 degrees below night setback temperature, the gas furnace shall be under PID control to maintain a fan discharge air temperature of 80 degree F adjustable, and all associated terminal boxes shall have their PID function reversed for heating.
2. Anytime the supply fan runs and the return air temperature is above the setback temperature, the discharge air PID shall sequence RMU mounted controls to control the gas furnace and DX coil as required to maintain the cooling setpoint.
3. Discharge supply air temperature shall be reset based on air temperature of selected rooms. The discharge air temperature control setpoint shall be incremental adjusted from 54 to 60 degree F at 0.5 degree F every ten minutes anytime all box dampers are throttling with all four reset parameters adjustable from operator graphic. Operator shall be able to assign any and all VVR room temperature sensors for reset control.

K. Damper Controls:

1. Provide separate analog outputs for gas furnace, outside air dampers, relief damper and return air damper.
2. Outdoor air dampers shall remain closed during warm-up and unoccupied periods.
3. Outdoor air dampers shall be fail safe type that fail closed.
4. Return damper shall be fail safe type that fail open.

L. Building Pressurization Control

1. Wall mounted relief damper shall be controlled based on building pressurization.
2. Provide two pressure differential sensors (farthest from the setpoint would lead) as shown on the plans to modulate the relief damper when the building pressure exceeds 0.03 (adjustable).

M. Morning Warm-Up Cycle:

1. If the optimum start program starts the RMU before the programmed occupation time, the RMU shall operate in the warm-up mode.
2. With RMU in morning warm-up mode, the outside air dampers shall remain closed, the DX cooling shall remain close and a signal shall be sent to open each VVR Terminal Unit to 75% of maximum.

N. Outside Airflow Control and Demand Control Ventilation (DCV) Using Air Flow Measuring:

1. With RMU in normal occupied status, return, relief and outside air dampers shall modulate to maintain the minimum specified outside airflow. Minimum airflow rates are as scheduled with the RMU's.
2. Flow shall be as determined by an Airflow Monitoring Station located in the minimum outside air duct.
3. During the occupied periods, modulate the outside air damper between the low and high airflow rates to maintain a maximum CO2 level of 1200 ppm at any CO2 sensors.
4. With RMU in the occupied mode, open the outside air damper and modulate the return air damper to maintain the outside airflow rate setpoint as defined by sensors and as measured by the AFMS.
5. Outside air override: If the return air humidity gets over 70 percent, cycle cooling and alarm at the user's interface.

O. RMUs Capacity Control:

1. The unit mounted control system shall lower OA to scheduled minimum as determined by space mounted CO2 sensors. Once RMU load reaches minimum load the compressors will be allowed to cycle with supply fan continuing to run. If return air humidity exceeds 70% with compressors cycling active HOT-GAS-BYPASS mode, HOT-GAS-BYPASS mode shall continue until return air humidity falls below 55%, where normal modulation and cycling shall resume.

P. Smoke Detection:

1. Fans shall stop upon signal from fire alarm system.
2. Activation of duct mounted type smoke detectors shall stop the RMU and close all dampers and signal fire alarm system.
3. Smoke detectors shall be located in the return and supply duct.
4. Smoke detectors shall be hardwired to fan starter.

Q. Freeze Protection has three levels:

1. Level One: If the RMU discharge air temperature drops below 48 degrees, close the outside air damper, disable outside air CM control, and alarm the digital system. This condition shall be manually reset from the OWS RMU graphic via a "Level One Freeze Protection Reset".
2. Level Two: If the RMU discharge air temperature drops below 40 degrees, stop the fan, and alarm the DDC SYSTEM RMUs. At the OWS, output the following message: "PAC Level Two freeze alarm. This RMU has been shut down due to extremely unsafe conditions. This system must be reset at the RMU via the Level 2 freeze reset button. Investigate the lack of heating and determine the reason for the shutdown prior to resetting the system."
3. Level Three: A manually reset gas furnace leaving air temperature freeze/reat, set at 35 degree F shall stop fan, signal alarm until the freeze/reat is reset.
4. Anytime the leaving gas furnace temperature drops below 50 degrees, turn on the gas furnace.

- R. High and Low Pressure Safety Cuts-outs: Provide pressure switch in supply and return duct near the unit to prevent damage due to over pressurization in the supply duct and under pressurization in the return duct. The RA and switch is used as safety. Switches shall be hardwired to stop fan when pressure exceeds maximum pressure rating of supply ductwork. Locate switch near discharge and suction of unit. Set supply at twenty percent (20%) above operating pressure when all boxes are at maximum airflow.

- S. Special Alarms: Provide alarms when any mixed air temperature reaches 35 degrees F.

1.3 VARIABLE VOLUME REHEAT AND COOLING TERMINAL UNITS (VVR-CC-XX & VAV-CC-XX)

A. Each terminal unit shall have an intelligent microprocessor based controller.

- B. VVR-CC-XX: Modulate the primary air damper and electric reheat coil in sequence to maintain room setpoint. On a decrease in room temperature, the damper actuator modulates from the maximum to the minimum cooling airflow setpoint. On a further decrease in room temperature, the damper actuator shall be modulated to the minimum heating airflow setpoint and the electric reheat modulated to full heat to maintain room temperature. The reverse sequence shall occur on a temperature increase. When RMU is off, the unit damper and electric reheat shall be commanded closed.

- C. VAV-CC-XX: Modulate the primary air damper to maintain room setpoint. On a decrease in room temperature, the damper actuator modulates from the maximum to the minimum cooling airflow setpoint. The reverse sequence shall occur on a temperature increase. When RMU is off, the unit damper shall be commanded closed.

- D. Minimum damper position is as scheduled. Provide heating minimum and cooling minimum. Provide dual minimums.

- E. Minimum velocity/damper setpoint shall be reset to allow up to the maximum design airflow rate through Terminal Unit when RMU is in the morning warm-up cycle.

- F. The discharge air temperature shall be monitored by the DDC controller.

- G. The DDC system shall have the capacity to set the following from the OWS:

1. Heating setpoint (only on VVR-CC-XX).
2. Cooling setpoint.
3. Maximum CFM setpoint.
4. Minimum CFM setpoint.
5. Night low and high limit setpoint.
6. Minimum velocity setpoint during morning warm-up.

- H. The DDC system shall have the capacity to read and reset the temperature setpoint from the OWS by plugging in the portable terminal into the space sensor and by plugging in the portable terminal into the intelligent unit controller.

- I. Provide occupant override on each space sensor to reset temperature and to override the un-occupied schedule. Un-occupied override shall include starting pumps and air handling units.

- J. Provide color graphic showing room temperature and fan status in tabular form with other like components.

1.4 WAREHOUSE HEATING AND VENTILATION SYSTEM

A. Heating & Ventilation Units (HVVU-CC-01 & 02)

1. Off and Normal Positions:
  - a. Fans shall be off, fan speed controllers signal shall be zero.

2. Fan control safeties shall include:
  - a. Smoke detectors mounted in the supply and return ducts.
  - b. Smoke detectors shall be hardwired to the fan motor starters and individually monitored by the DDC SYSTEM.

3. Start/Stop:

- a. The HOA switch is located on the variable speed drives.
- b. When the fan HOA switch is in the hand position, fan shall operate at the automatically controlled speed subject to other specified safety interlocks.
- c. When the HOA switch is in the "off" position, the fan shall stop and all controlled devices shall return to their normal position.
- d. When the HOA switch is in the "auto" position, the fan shall be started by DDC SYSTEM, subject to specified safety interlocks.

4. Occupied-Unoccupied Mode Control:

- a. Upon activation through DDC system, the unit shall run continuously until space is satisfied.

5. Fan and Filter Status:

- a. Provide a fan current status through VFD contacts.
- b. Provide differential pressure switch at filter bank to indicate filter status.

6. Fan Speed:

- a. The fan is variable speed. The variable speed drive is specified elsewhere as a variable frequency drive.
- b. The speed controllers shall accept a control signal input of 4-20mA or 0-10 V dc for modulation control (coordinate with specified manufacturers.)
- c. Fan speed (indicated in the form of digital RPM indicators located on the variable speed drive panel) shall be monitored by the OWS.
- d. With switch in the Hand position the fan shall operate automatically at rpm to satisfy the space setpoint temperature.
- e. With the switch in the Auto position, the controls shall operate as:
  - 1) Space temperature sensor shall modulate the fan variable speed drive to maintain space at setpoint.
  - 2) The fan speed shall be under PID control. Upon start-up the PID setpoint shall be slowly ramped up at a rate to provide fan loading of 0-100 percent over a sixty second (adjustable) period.

7. Variable Speed Motor Controller Monitoring: For each piece of equipment with variable speed controller monitor VFD operations through the DDC SYSTEM.

8. Heating & Ventilation Units shall maintain space at heating setpoint of 70 deg F (adjustable). The control system shall also limit the units leaving air temperature at 100 deg F.

B. Infrared Heaters (IRH-CC-01 to IRH-CC-17)

1. Off and Normal Positions:
  - a. Burner shall be off, and unit mounted controls
  - b. Warehouse door OPENED/CLOSED status via door switch & relay
  - c. Factory supplied temperature controller
  - d. 24volt ON/OFF contactors

2. START/STOP:

- a. During occupied hours and in heating season, when associated door gets open infrared heater shall come on with factory supplied controllers to satisfy the space setpoint. Warehouse door shall be hard wired to associated infrared heater.
- b. During unoccupied hours if the space temperature satisfied, the infrared heater shall turn off.
- c. The units shall not operate outside occupied hours or non-heating seasons.
- d. DDC system shall monitor ON/OFF status of each heater.

C. Ventilation Fans (REF-CC-02 to REF-CC-11):

1. Fans operating and safety controls:
  - a. Fans shall be interlocked with Air Rotation units so they should operate simultaneously, except REF-CC-03 & 07 with VTDs.
  - b. Warehouse rollup doors are provided with relays to update the DDC system their opened/closed status.
  - c. Wall mounted temperature sensors.
  - d. VFD on REF-CC-03 & 07.
  - e. Current sensors on REF-CC-01, 02, 04/06, 08-10.
  - f. Normally closed fan isolation dampers.

2. Sequence of Operations:

- a. During the normal occupied hours with all safety controls in normal position (when IRH-CC and HVVU-CC are not operating, and the associated warehouse on landscape are proved open), the DDC SYSTEM upon getting signal from space temperature sensor, shall open the associated automatic dampers and energize the exhaust fans.
- b. Fans only operate during the normal occupied hours.
- c. When the fan HOA switch is in the hand position, fan shall operate at the automatically controlled speed subject to other specified safety interlocks.

3. System alarms: the control system shall accomplish the following actions and / or issue the following alarms to the user interface computer:
  - a. Alarm user interface, if fan current is at plus or minus 10% (adjustable) of full load current for 2 minutes or longer (adjustable). Full load current shall be as determined during test and balance.
  - b. Alarm user interface if fan is operating in manual override as determined by fan operation outside the control of the control system. The alarm shall add the minutes of manual override operation.

1.5 SPLIT SYSTEM (AC-CC-01 & CU-CC-01)

- A. Unit shall be provided with factory supplied unitary controller.

- B. With all safety controls in normal position the unit shall be automatically turned ON through DDC system. DDC system shall open the minimum outside to full open position and let the unit mounted control to maintain the space a setpoint.

- C. System shall be capable of switching between heating and cooling seasons.

- D. The DDC system shall monitor the space temperature and alarm the interface whenever the space is 2 degrees F above the setpoint (adjustable).

E. Economizer control (maximum outside air damper):

1. Whenever the outside air temperature is below the economizer switchover setpoint of 60°F (adjustable) the unit shall operate under the economizer mode.
2. During the economizer mode, the minimum OA damper shall modulate to fully close.
3. The economizer outside air damper shall modulate open on a call for cooling from the discharge temperature control signal.
4. If the economizer air damper reaches maximum open and cannot maintain the supply air temperature or room setpoint, the mechanical cooling shall sequence to activate.
5. Likewise, whenever the supply air temperature drops below the setpoint for 10 minutes (adjustable), the control system shall modulate the maximum OA damper and return air damper in sequence to maintain the supply air temperature at setpoint.
6. The control system shall modulate the return air damper and wall mounted relief air damper in sequence to maintain the plenum pressure and the space pressure at set points; the setpoint pressures shall be determined at test and balance.

1.6 EXHAUST FANS

A. EF-CC-01 & REF-CC-01:

1. Fans operating and safety controls:
  - a. Fan shall be interlocked with its associated air conditioning units.
  - b. Current sensor.
  - c. Automatic isolation damper.
2. Sequence of Operations:
  - a. During the normal occupied hours with all safety controls in normal position, the DDC SYSTEM shall open the automatic isolation damper, energizes the exhaust fan.
  - b. Provide fan status.
3. System alarms: the control system shall accomplish the following actions and / or issue the following alarms to the user interface computer:
  - a. Alarm user interface, if fan current is at plus or minus 10% (adjustable) of full load current for 2 minutes or longer (adjustable). Full load current shall be as determined during test and balance.
  - b. Alarm user interface if fan is operating in manual override as determined by fan operation outside the control of the control system. The alarm shall add the minutes of manual override operation.

7. A mixed air low limit program will modulate the maximum outside air damper to closed position on a fall in mixed air temperature below setpoint of 45 deg. F (adjustable).
8. When not in economizer mode, the maximum outside air damper will be closed and the mechanical cooling will maintain the discharge temperature at setpoint.
9. Whenever the return air humidity rises above 65% (adjustable) the economizer mode will be deactivated.
10. The economizer damper shall be interlocked via hard wired connection with the freeze/reat to cut the power off for the spring return actuated damper in case temperature falls below 40°F (adjustable).

F. Building Pressurization Control

1. Wall mounted relief damper shall be controlled based on building pressurization.
2. Provide one pressure differential sensors as shown on the plans to modulate the relief damper when the building pressure exceeds 0.03 (adjustable).

1.6 EXHAUST FANS

A. EF-CC-01 & REF-CC-01:

1. Fans operating and safety controls:
  - a. Fan shall be interlocked with its associated air conditioning units.
  - b. Current sensor.
  - c. Automatic isolation damper.

2. Sequence of Operations:

- a. During the normal occupied hours with all safety controls in normal position, the DDC SYSTEM shall open the automatic isolation damper, energizes the exhaust fan.
- b. Provide fan status.
3. System alarms: the control system shall accomplish the following actions and / or issue the following alarms to the user interface computer:
  - a. Alarm user interface, if fan current is at plus or minus 10% (adjustable) of full load current for 2 minutes or longer (adjustable). Full load current shall be as determined during test and balance.
  - b. Alarm user interface if fan is operating in manual override as determined by fan operation outside the control of the control system. The alarm shall add the minutes of manual override operation.

B. EF-CC-02:

1. Start-stop control:
  - a. Provide hand/ off/ auto control. Under auto control the fan shall operate under control of DDC system.
  - b. Fan control: the fan shall only run if the space temperature goes above 85°F for 10 (ten) minutes or longer through DDC system.
  - c. DDC system shall open the wall mounted damper and then energizes the wall exhaust fan. The reverse shall be followed by shutting off the system, if room temperature is below 75°F.

2. Provide fan status.

3. System alarms: the control system shall accomplish the following actions and / or issue the following alarms to the user interface computer:
  - a. Alarm user interface, if fan current is at plus or minus 10% (adjustable) of full load current for 2 minutes or longer (adjustable). Full load current shall be as determined during test and balance.
  - b. Alarm user interface if fan is operating in manual override as determined by fan operation outside the control of the control system. The alarm shall add the minutes of manual override operation.

C. EF-CC-03:

1. Start-stop control:
  - a. Provide hand/ off/ auto control. Under auto control the fan shall operate under control of the DDC System.
  - b. Fan control: the fan shall only run if the space temperature goes above 80°F for 10 (ten) minutes or longer through DDC system.

2. Provide fan status.

3. System alarms: the control system shall accomplish the following actions and / or issue the following alarms to the user interface computer:
  - a. Alarm user interface, if fan current is at plus or minus 10% (adjustable) of full load current for 2 minutes or longer (adjustable). Full load current shall be as determined during test and balance.
  - b. Alarm user interface if fan is operating in manual override as determined by fan operation outside the control of the control system. The alarm shall add the minutes of manual override operation.

D. REF-CC-02, 04/08, 10 & 11:

1. Off and Normal Positions:
  - a. Normally closed isolation dampers shall be closed.

2. Start/Stop:

- a. Provide hand/ off/ auto control. Under auto control the fan shall operate under control of the DDC System.
- b. Fan control: the fan shall only run if the space temperature goes above 85°F for 10 (ten) minutes or longer through DDC system.

3. Fans operating and safety controls:

- a. Fan shall be interlocked with its warehouse rollup doors.
- b. Automatic isolation damper.
- c. Space mounted temperature sensor.